

TEST REPORT

Applicant : Sharp Corporation, Communication Systems Group
Address : 2-13-1, Iida Hachihonmatsu, Higashi-Hiroshima City, Hiroshima,
739-0192, JAPAN

Products : Cellular Phone
Model No. : SH-02E
SERIAL NO. : 004401114215201
004401114215383

FCC ID : APYHRO00180

Test Standard : CFR 47 FCC Rules and Regulations Part 15

Test Results : **Passed**

Date of Test : October 9 ~ 17, 2012



Kousei Shibata
Manager
Japan Quality Assurance Organization
KITA-KANSAI Testing Center
SAITO EMC Branch
7-3-10, Saito-asagi, Ibaraki-shi, Osaka 567-0085, Japan

- The measurement values stated in Test Report was made with traceable to National Institute of Advanced Industrial Science and Technology (AIST) of Japan and National Institute of Information and Communications Technology (NICT) of Japan.
- The applicable standard, testing condition and testing method which were used for the tests are based on the request of the applicant.
- The test results presented in this report relate only to the offered test sample.
- The contents of this test report cannot be used for the purposes, such as advertisement for consumers.
- This test report shall not be reproduced except in full without the written approval of JQA.
- VLAC does not approve, certify or warrant the product by this test report.

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DEFINITIONS FOR ABBREVIATION AND SYMBOLS USED IN THIS TEST REPORT**EUT** : Equipment Under Test**EMC** : Electromagnetic Compatibility**AE** : Associated Equipment**EMI** : Electromagnetic Interference**N/A** : Not Applicable**EMS** : Electromagnetic Susceptibility**N/T** : Not Tested - indicates that the listed condition, standard or equipment is applicable for this report. - indicates that the listed condition, standard or equipment is not applicable for this report.

1 Description of the Equipment Under Test

1. Manufacturer : Sharp Corporation, Communication Systems Group
2-13-1, Iida Hachihonmatsu, Higashi-Hiroshima City, Hiroshima,
739-0192, JAPAN
2. Products : Cellular Phone
3. Model No. : SH-02E
4. Serial No. : 004401114215201
: 004401114215383
5. Product Type : Pre-production
6. Date of Manufacture : September, 2012
7. Power Rating : 4.0VDC (Internal Lithium-ion Battery 2320mAh)
8. EUT Grounding : None
9. Transmitting Frequency : 2402.0 MHz(00CH) –2480.0MHz(78CH/39CH)
10. Receiving Frequency : 2402.0 MHz(00CH) –2480.0MHz(78CH/39CH)
11. Max. RF Output Power : 2.97dBm(Measure Value)
12. Category : Spread Spectrum Transmitter(FHSS)/DTS
13. EUT Authorization : Certification
14. Received Date of EUT : October 5, 2012

15. Channel Plan

The carrier spacing is 1 MHz/2MHz.

The carrier frequency is designated by the absolute frequency channel number (ARFCN).

The carrier frequency is expressed in the equation shown as follows:

Normal Mode:

Transmitting Frequency (in MHz) = 2402.0 + n

Receiving Frequency (in MHz) = 2402.0 + n

where, n : channel number ($0 \leq n \leq 78$)

Low Energy Mode:

Transmitting Frequency (in MHz) = 2402.0 + 2*n

Receiving Frequency (in MHz) = 2402.0 + 2*n

where, n : channel number ($0 \leq n \leq 39$)

2 Summary of Test Results

Applied Standard : CFR 47 FCC Rules and Regulations Part 15
Subpart C – Intentional Radiators

The EUT described in clause 1 was tested according to the applied standard shown above.
Details of the test configuration is shown in clause 6.

The conclusion for the test items of which are required by the applied standard is indicated under the test result.

- The test result was **passed** for the test requirements of the applied standard.
- The test result was **failed** for the test requirements of the applied standard.
- The test result was **not judged** the test requirements of the applied standard.

In the approval of test results,

- Determining compliance with the limits in this report was based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.
- No deviations were employed from the applied standard.
- No modifications were conducted by JQA to achieve compliance to the limitations.

Reviewed by:

Tested by:



Shigeru Kinoshita
Deputy Manager
JQA KITA-KANSAI Testing Center
SAITO EMC Branch



Shigeru Osawa
Deputy Manager
JQA KITA-KANSAI Testing Center
SAITO EMC Branch

3 Test Procedure

Test Requirements : §15.247, §15.207 and §15.209

Test Procedure : ANSI C63.4-2003

The tests were performed with reference to the FCC Public Notice DA 00-705, released March 30, 2000 and the FCC KDB 558074 D01 DTS Meas Guidance, released October 4, 2012. The test set-up was made in accordance to the general provisions of ANSI C63.4-2003.

4 Test Location

Japan Quality Assurance Organization (JQA)
KITA-KANSAI Testing Center
7-7, Ishimaru, 1-chome, Minoh-shi, Osaka, 562-0027, Japan
SAITO EMC Branch
7-3-10, Saito-asagi, Ibaraki-shi, Osaka 567-0085, Japan

5 Recognition of Test Laboratory

JQA KITA-KANSAI Testing Center SAITO EMC Branch is accredited under ISO/IEC 17025 by following accreditation bodies and the test facility is registered by the following bodies.

VLAC Accreditation No. : VLAC-001-2 (Expiry date : March 30, 2014)
VCCI Registration No. : A-0002 (Expiry date : March 30, 2014)
BSMI Registration No. : SL2-IS-E-6006, SL2-IN-E-6006, SL2-AI-E-6006
(Expiry date : September 14, 2013)
IC Registration No. : 2079E-3, 2079E-4 (Expiry date : July 20, 2014)

Accredited as conformity assessment body for Japan electrical appliances and material law by METI.
(Expiry date : February 22, 2013)

6 Details of the Equipment Under Test

6.1 Operating Condition

Transmitting/Receiving

Bluetooth 4.0 + EDR + LE

Transmitting frequency : 2402.0 MHz(0CH) – 2480.0 MHz(78CH/39CH)

Receiver frequency : 2402.0 MHz(0CH) – 2480.0 MHz(78CH/39CH)

The test were carried under 2 mode shown as follows:

1. Standard+EDR
2. Low Energy

Modulation Type

1. DH1/ DH3/ DH5 Packet (Modulation Type : GFSK)
2. 2DH1/ 2DH3/ 2DH5 Packet (Modulation Type : pi/4-DQPSK)
3. 3DH1/ 3DH3/ 3DH5 Packet (Modulation Type : 8DPSK)
4. LE Packet (Modulation Type : GFSK)

Other Clock Frequency

32.768 kHz, 19.2 MHz, 27 MHz, 27.12 MHz, 37.4 MHz

The EUT was rotated through three orthogonal axis (X, Y and Z axis) in radiated measurement.
The EUT with temporary antenna port was used in conducted measurement.

6.2 Test Configuration

The equipment under test (EUT) consists of :

| | Item | Manufacturer | Model No. | Serial No. | FCC ID |
|---|---------------------------|--------------|----------------------|--|-------------|
| A | Cellular Phone | Sharp | SH-02E | 0044011142 15201*1) 0044011142 15383*2) | APYHRO00180 |
| B | AC Adapter for Global use | NTT DoCoMo | MAS-BH0008 -A 002 | -- | N/A |
| C | USB conversion cable | Sharp | SH-02E(Optional) | -- | N/A |
| D | Stereo Handsfree | Sharp | SHLDL1 | -- | N/A |

*1) Used for AC Powerline Conducted Emission and Field Strength of Spurious Emission

*2) Used for Antenna Conducted Emission

The auxiliary equipment used for testing :

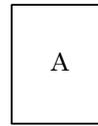
None

Type of Cable:

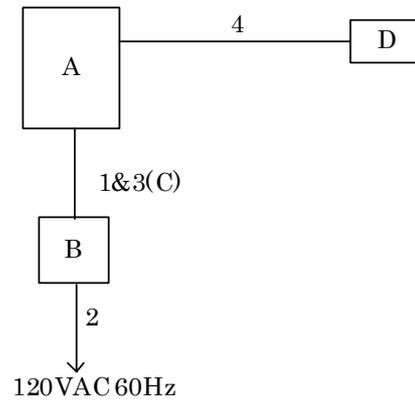
| No. | Description | Identification (Manu. etc.) | Connector Shielded | Cable Shielded | Ferrite Core | Length (m) |
|-----|----------------------|--------------------------------|-----------------------|-------------------|-----------------|---------------|
| 1 | DC Power Cord | -- | -- | NO | NO | 1.5 |
| 2 | AC Power Cord | -- | -- | NO | NO | 0.5 |
| 3 | USB conversion cable | -- | -- | NO | NO | 0.1 |
| 4 | Handsfree Cable | -- | NO | -- | NO | 1.5 |

6.3 Test Arrangement (Drawings)

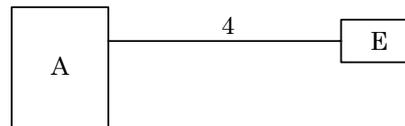
a) Single Unit



b) AC Adapter used



c) Stereo Earphone used



7 Details of the Test Item**7.1 Channel Separation**

For the requirements, - Applicable - Tested. - Not tested by applicant request.]
 - Not Applicable

For the limits, - Passed - Failed - Not judged

7.1.1 Worst Point and Measurement Uncertainty

Channel Separation is 1.002 MHz
Channel Separation(Inquiry) is 2.000 MHz

Uncertainty of Measurement Results +/-0.9 %(2σ)

Remarks : _____

7.1.2 Test Site

KITA-KANSAI Testing Center

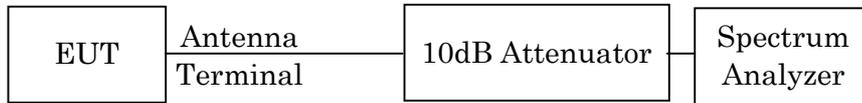
Test site : SAITO - Anechoic chamber (A1) - Measurement room (M1)
 - Measurement room (M2) - Measurement room (M3)
 - Shielded room (S1) - Shielded room (S2)
 - Shielded room (S3) - Shielded room (S4)

7.1.3 Test Instruments

| Type | Model | Manufacturer | ID No. | Last Cal. | Interval |
|-------------------|-------------|--------------|--------|-----------|----------|
| Spectrum Analyzer | E4446A | Agilent | A-39 | 2012/9 | 1 Year |
| Attenuator | 54A-10 | Weinschel | D-28 | 2012/9 | 1 Year |
| RF Cable | SUCOFLEX102 | SUHNER | C-52 | 2012/7 | 1 Year |

7.1.4 Test Method and Test Setup (Diagrammatic illustration)

The test system is shown as follows:



The setting of the spectrum analyzer are shown as follows:

| | |
|-----------------|---------------|
| Res. Bandwidth | 100 kHz |
| Video Bandwidth | 300 kHz |
| Span | 3 MHz / 5 MHz |
| Sweep Time | AUTO |
| Trace | Maxhold |

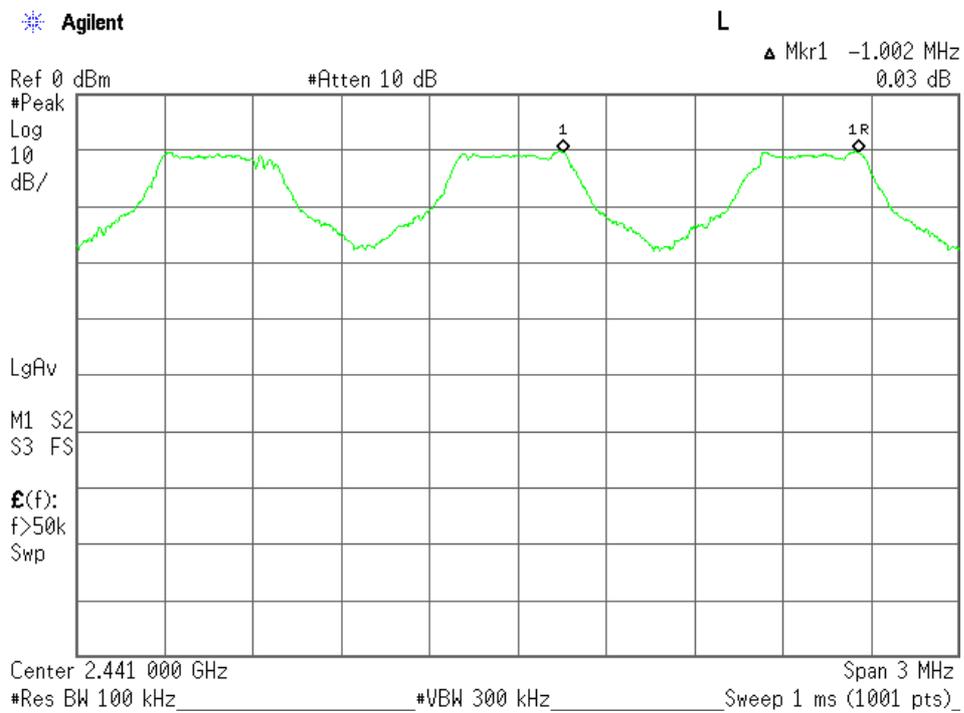
7.1.5 Test Data

Test Date : October 9, 2012

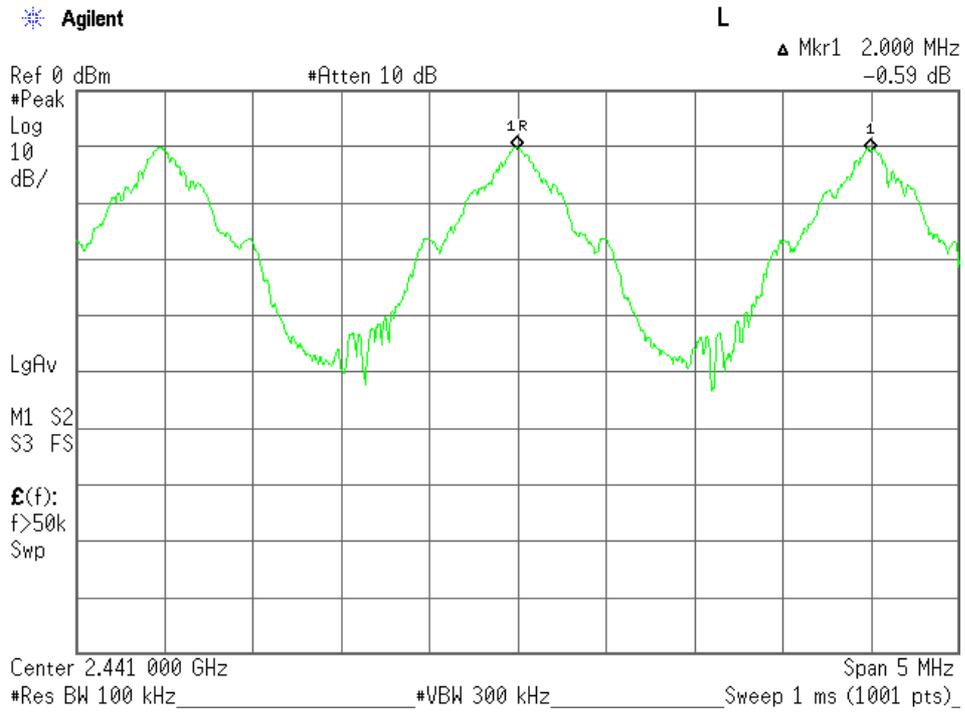
Temp.:25°C, Humi:47%

| Mode of EUT | Channel Separation (MHz) |
|-------------|--------------------------|
| Hopping | 1.002 |
| Inquiry | 2.000 |

Mode of EUT : Hopping



Mode of EUT : Inquiry



7.2 Minimum Hopping Channel

For the requirements, - Applicable - Tested. - Not tested by applicant request.]
 - Not Applicable

For the limits, - Passed - Failed - Not judged

7.2.1 Worst Point and Measurement Uncertainty

| | |
|--------------------------------|-----------|
| Number of Channel is | <u>79</u> |
| Number of Channel (Inquiry) is | <u>32</u> |
| Number of Channel (AFH) is | <u>20</u> |

Remarks : _____

7.2.2 Test Site

KITA-KANSAI Testing Center

Test site : SAITO

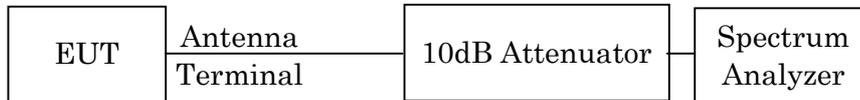
| | |
|--|--|
| <input type="checkbox"/> - Anechoic chamber (A1) | <input type="checkbox"/> - Measurement room (M1) |
| <input type="checkbox"/> - Measurement room (M2) | <input type="checkbox"/> - Measurement room (M3) |
| <input type="checkbox"/> - Shielded room (S1) | <input type="checkbox"/> - Shielded room (S2) |
| <input type="checkbox"/> - Shielded room (S3) | <input checked="" type="checkbox"/> - Shielded room (S4) |

7.2.3 Test Instruments

| Type | Model | Manufacturer | ID No. | Last Cal. | Interval |
|-------------------|-------------|--------------|--------|-----------|----------|
| Spectrum Analyzer | E4446A | Agilent | A-39 | 2012/9 | 1 Year |
| Attenuator | 54A-10 | Weinschel | D-28 | 2012/9 | 1 Year |
| RF Cable | SUCOFLEX102 | SUHNER | C-52 | 2012/7 | 1 Year |

7.2.4 Test Method and Test Setup (Diagrammatic illustration)

The test system is shown as follows:



The setting of the spectrum analyzer are shown as follows:

| | |
|-----------------|---------|
| Res. Bandwidth | 300 kHz |
| Video Bandwidth | 300 kHz |
| Span | 30 MHz |
| Sweep Time | AUTO |
| Trace | Maxhold |

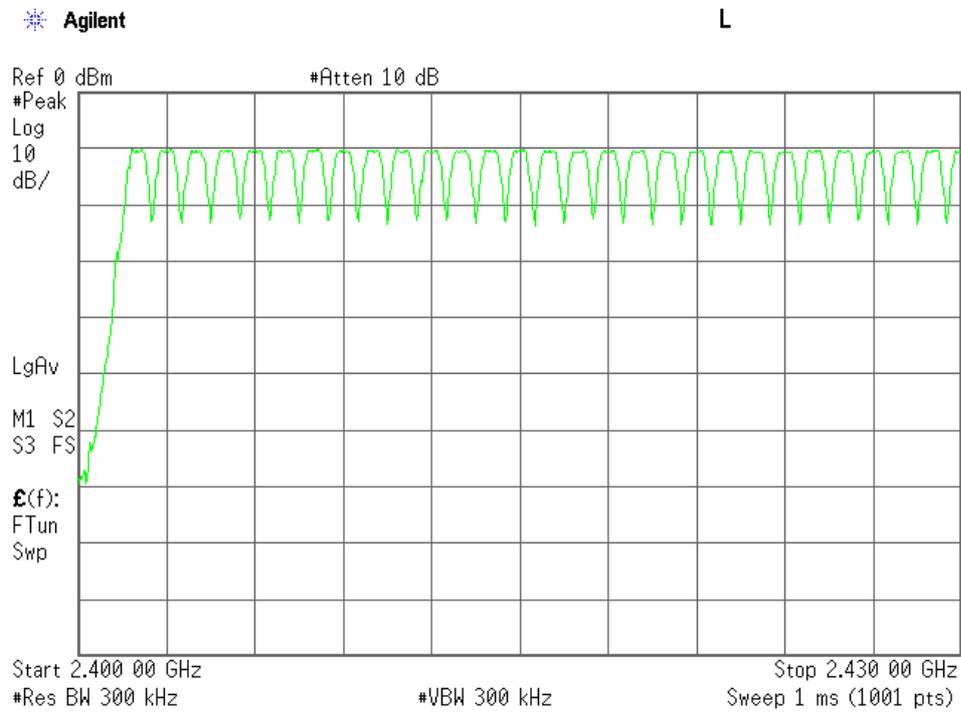
7.2.5 Test Data

Test Date : October 9, 2012

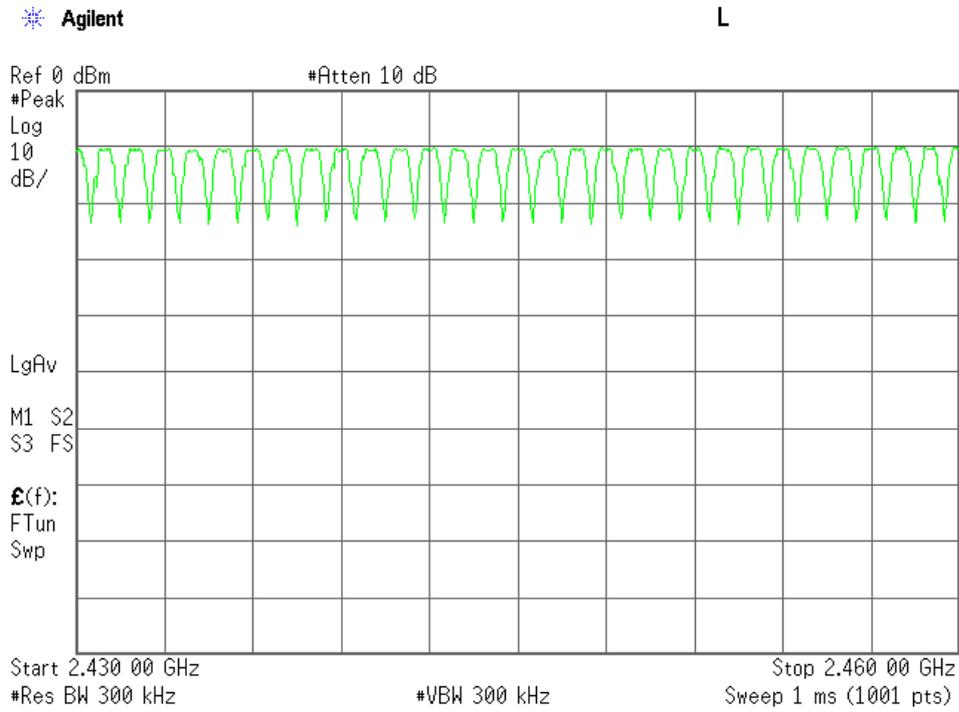
Temp.:25°C, Humi:47%

| Mode of EUT | Minimum Hopping Channel |
|--------------|-------------------------|
| Hopping | 79 |
| Inquiry | 32 |
| AFH(minimum) | 20 |

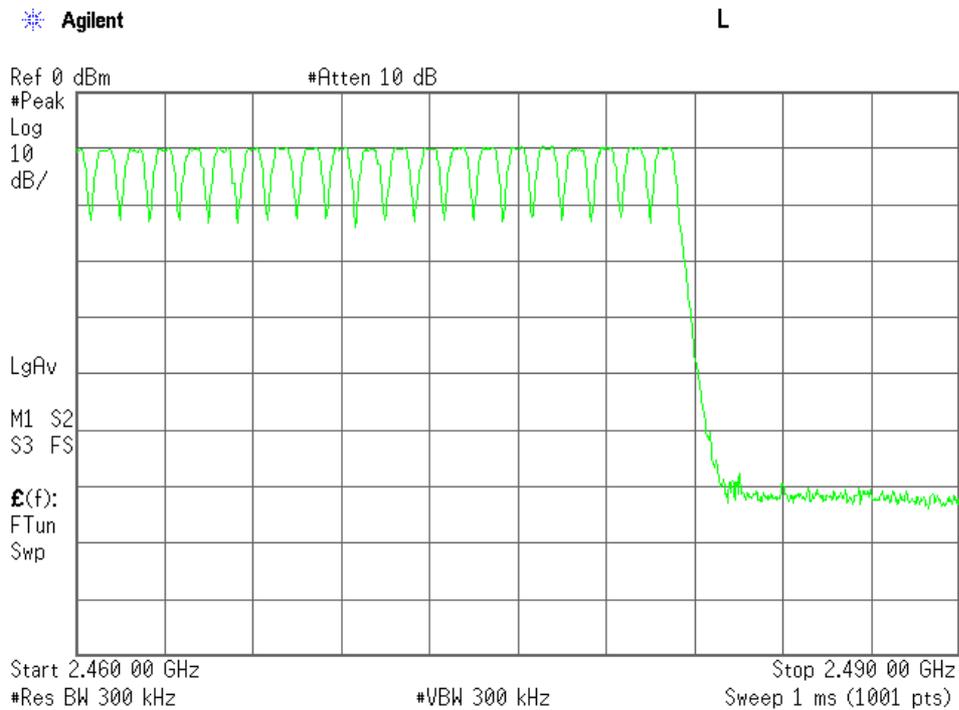
Mode of EUT : Hopping(1/3)



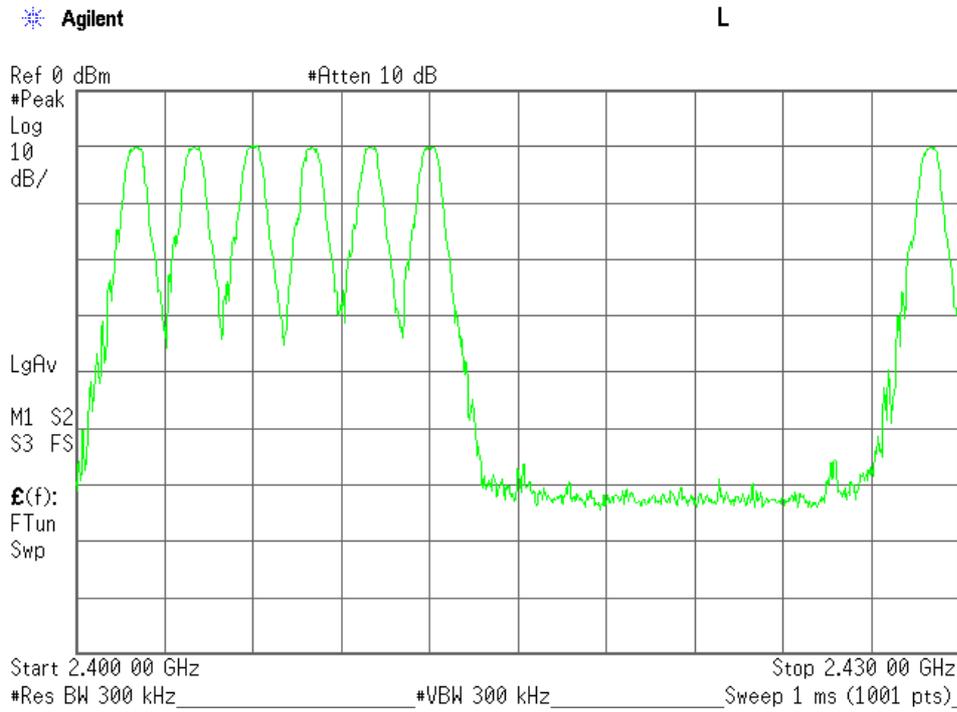
Mode of EUT : Hopping(2/3)



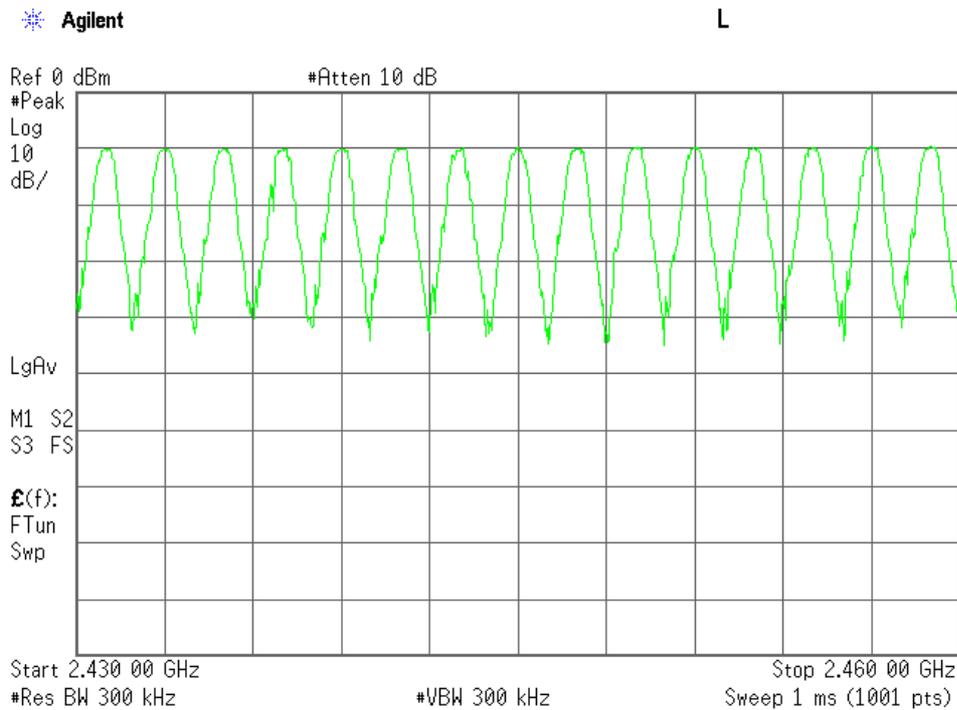
Mode of EUT : Hopping(3/3)



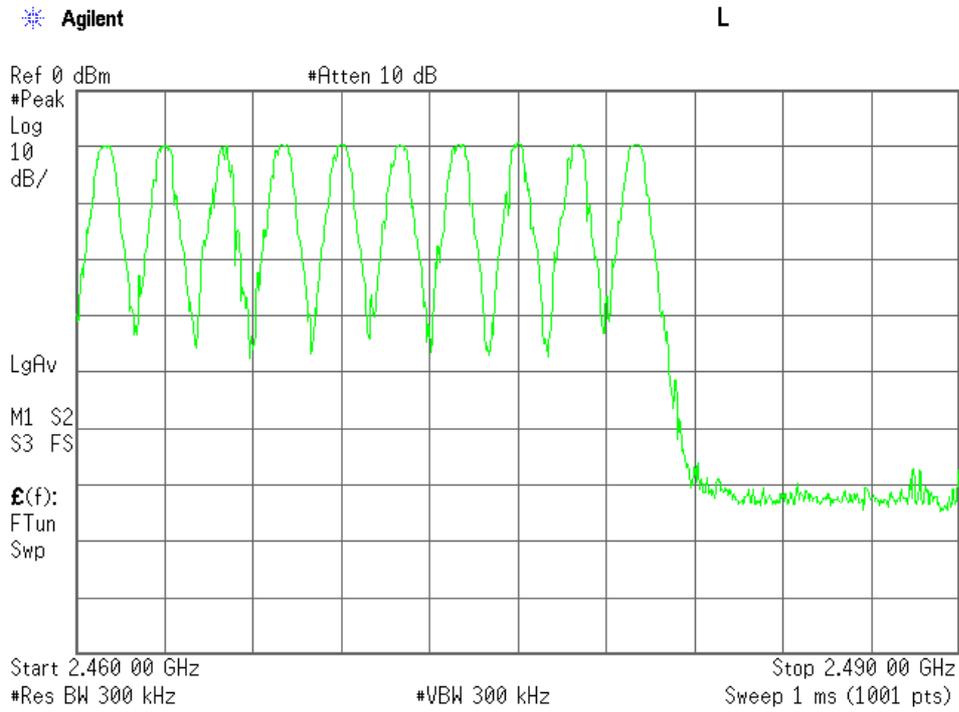
Mode of EUT : Inquiry(1/3)



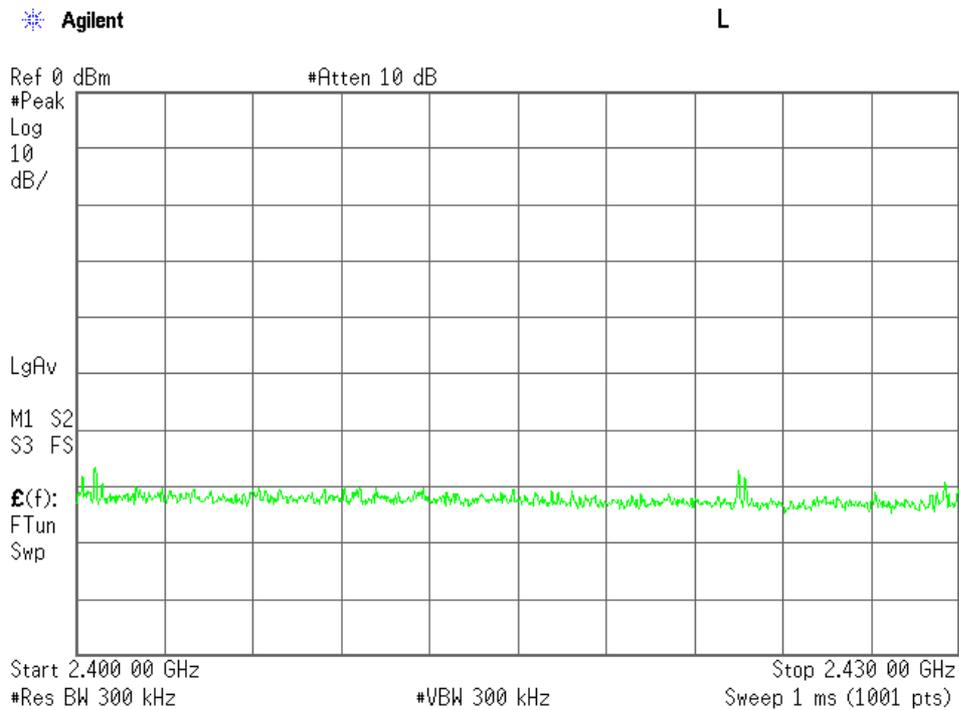
Mode of EUT : Inquiry(2/3)



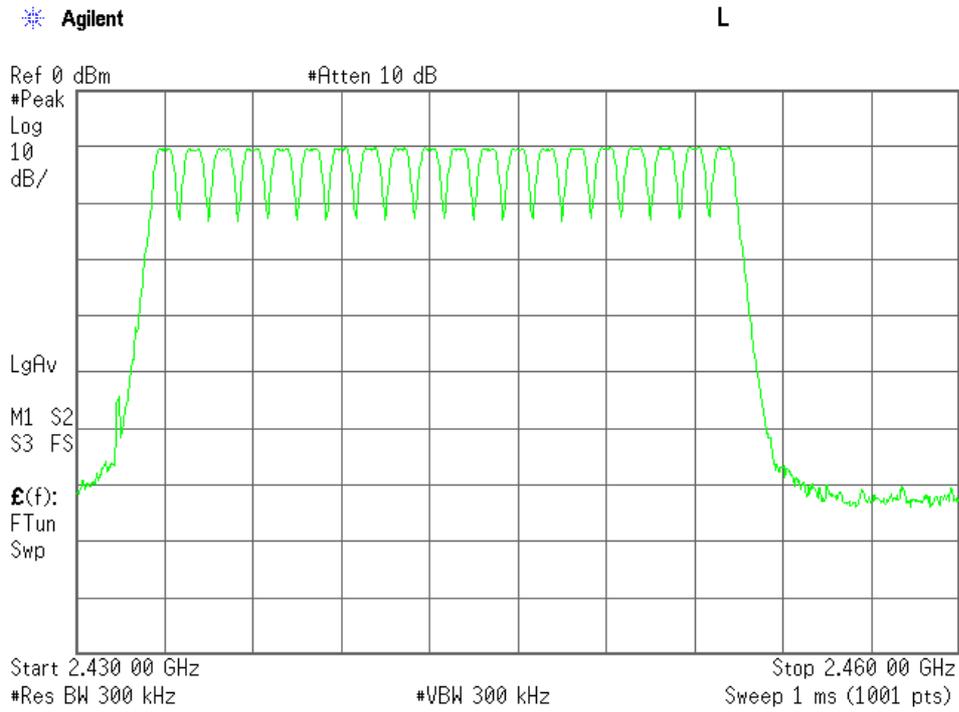
Mode of EUT : Inquiry(3/3)



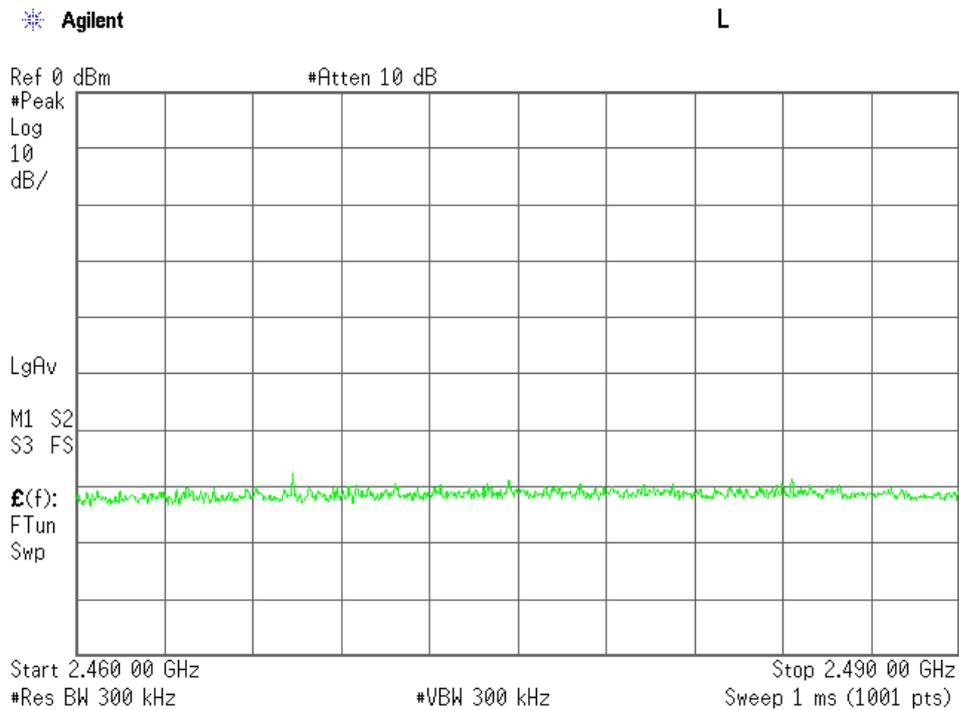
Mode of EUT : AFH(minimum)(1/3)



Mode of EUT : AFH(minimum) (2/3)



Mode of EUT : AFH(minimum) (3/3)



7.3 Occupied Bandwidth

For the requirements, - Applicable - Tested. - Not tested by applicant request.]
 - Not Applicable

For the limits, - Passed - Failed - Not judged

7.3.1 Worst Point and Measurement Uncertainty

| | | | |
|-----------------------|-------------------|----|-------------------|
| The 99% Bandwidth is | <u>1201.1</u> kHz | at | <u>2402.0</u> MHz |
| The 20dB Bandwidth is | <u>1318.0</u> kHz | at | <u>2441.0</u> MHz |
| The 6dB Bandwidth is | <u>629.3</u> kHz | at | <u>2480.0</u> MHz |

Uncertainty of Measurement Results +/-0.9 %(2 σ)

Remarks : _____

7.3.2 Test Site

KITA-KANSAI Testing Center

Test site : SAITO

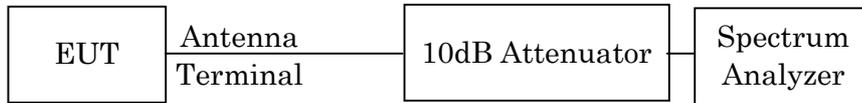
| | |
|--|--|
| <input type="checkbox"/> - Anechoic chamber (A1) | <input type="checkbox"/> - Measurement room (M1) |
| <input type="checkbox"/> - Measurement room (M2) | <input type="checkbox"/> - Measurement room (M3) |
| <input type="checkbox"/> - Shielded room (S1) | <input type="checkbox"/> - Shielded room (S2) |
| <input type="checkbox"/> - Shielded room (S3) | <input checked="" type="checkbox"/> - Shielded room (S4) |

7.3.3 Test Instruments

| Type | Model | Manufacturer | ID No. | Last Cal. | Interval |
|-------------------|-------------|--------------|--------|-----------|----------|
| Spectrum Analyzer | E4446A | Agilent | A-39 | 2012/9 | 1 Year |
| Attenuator | 54A-10 | Weinschel | D-28 | 2012/9 | 1 Year |
| RF Cable | SUCOFLEX102 | SUHNER | C-52 | 2012/7 | 1 Year |

7.3.4 Test Method and Test Setup (Diagrammatic illustration)

The test system is shown as follows:



The setting of the spectrum analyzer are shown as follows:

| | |
|-----------------|---------|
| Res. Bandwidth | 10 kHz |
| Video Bandwidth | 30 kHz |
| Span | 3 MHz |
| Sweep Time | AUTO |
| Trace | Maxhold |

7.3.5 Test Data

Mode of EUT : Standard+EDR

Test Date : October 9, 2012

Temp.:25°C, Humi:47%

The resolution bandwidth was set to about 1% of emission bandwidth, -20dBc display line was placed on the screen (or 99% bandwidth), the occupied bandwidth is the delta frequency between the two points where the display line intersects the signal trace.

1)Packet Setting : DH5(Modulation type : GFSK)

| Channel | Frequency (MHz) | 99% Bandwidth (kHz) | -20dBc Bandwidth (kHz) |
|---------|-----------------|---------------------|------------------------|
| 00 | 2402.0 | 841.0 | 920.8 |
| 39 | 2441.0 | 837.3 | 921.4 |
| 78 | 2480.0 | 837.1 | 921.9 |

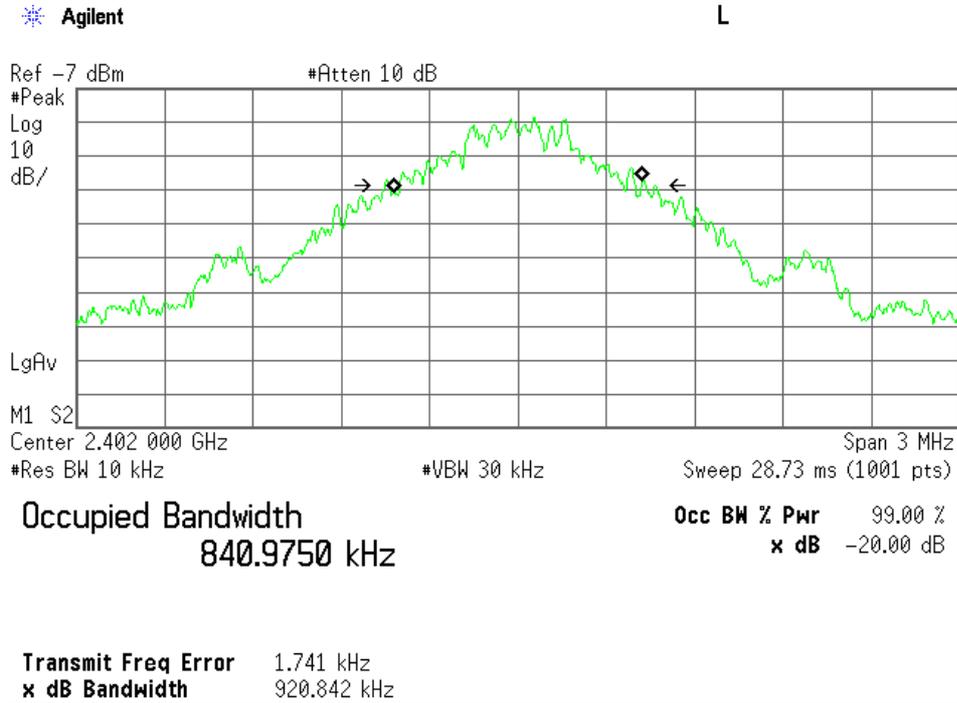
2)Packet Setting : 2DH5(Modulation type : pi/4-DQPSK)

| Channel | Frequency (MHz) | 99% Bandwidth (kHz) | -20dBc Bandwidth (kHz) |
|---------|-----------------|---------------------|------------------------|
| 00 | 2402.0 | 1189.0 | 1317.0 |
| 39 | 2441.0 | 1189.2 | 1318.0 |
| 78 | 2480.0 | 1189.4 | 1317.0 |

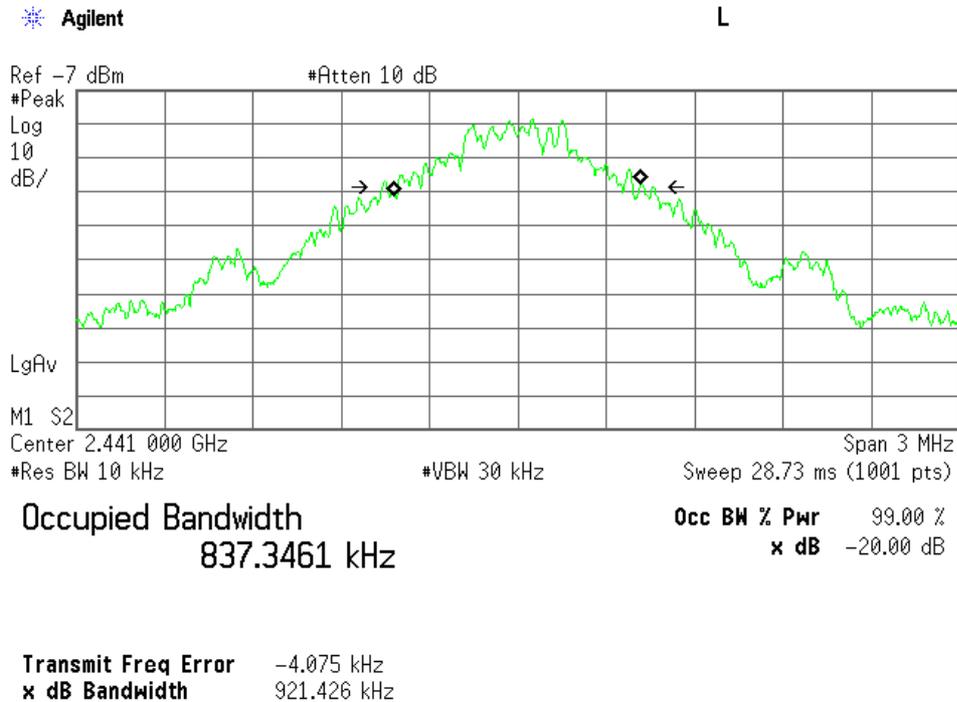
3)Packet Setting : 3 DH5(Modulation type : 8DPSK)

| Channel | Frequency (MHz) | 99% Bandwidth (kHz) | -20dBc Bandwidth (kHz) |
|---------|-----------------|---------------------|------------------------|
| 00 | 2402.0 | 1201.1 | 1268.0 |
| 39 | 2441.0 | 1200.3 | 1267.0 |
| 78 | 2480.0 | 1200.6 | 1267.0 |

1)Packet Setting : DH5(Modulation type : GFSK)
Low Channel



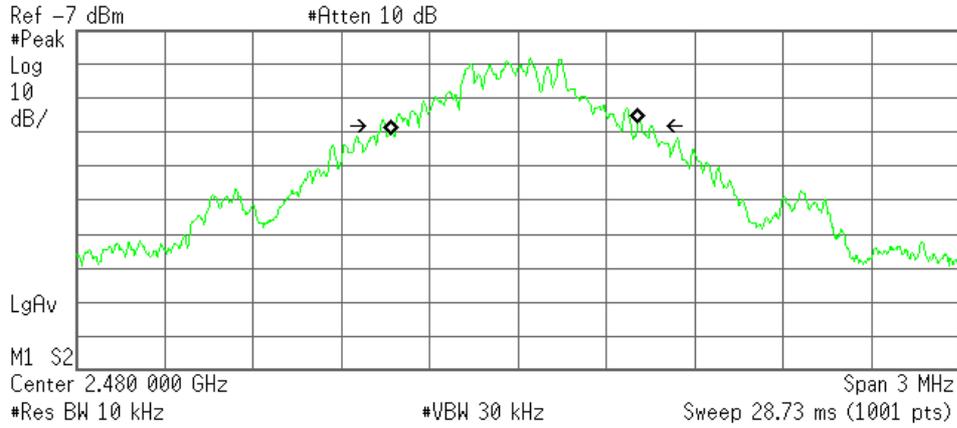
Middle Channel



High Channel

* Agilent

L

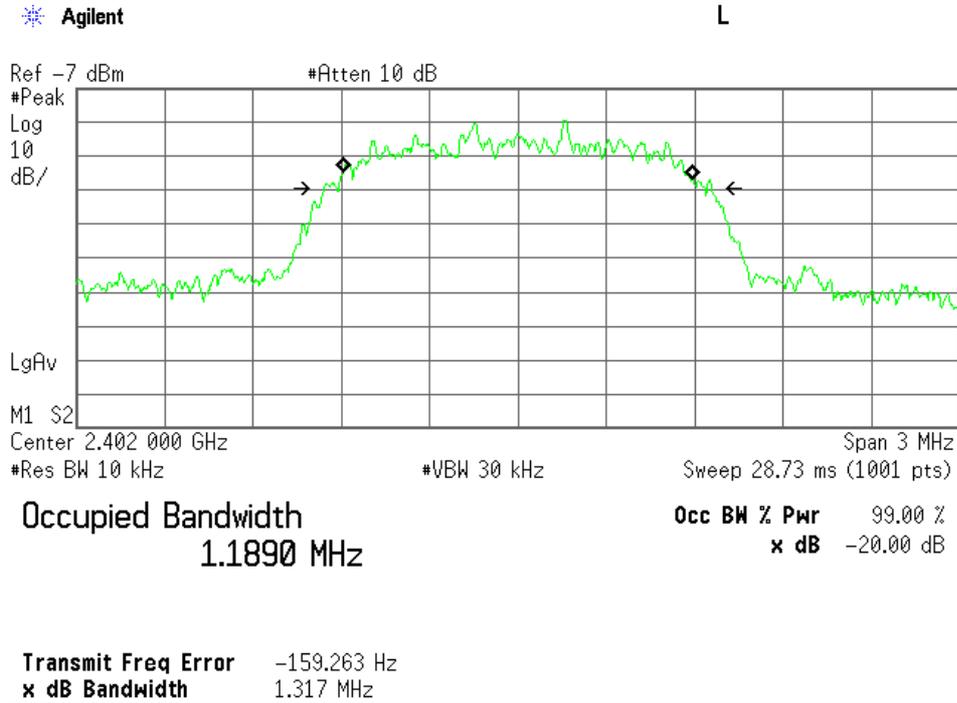


Occupied Bandwidth
837.0941 kHz

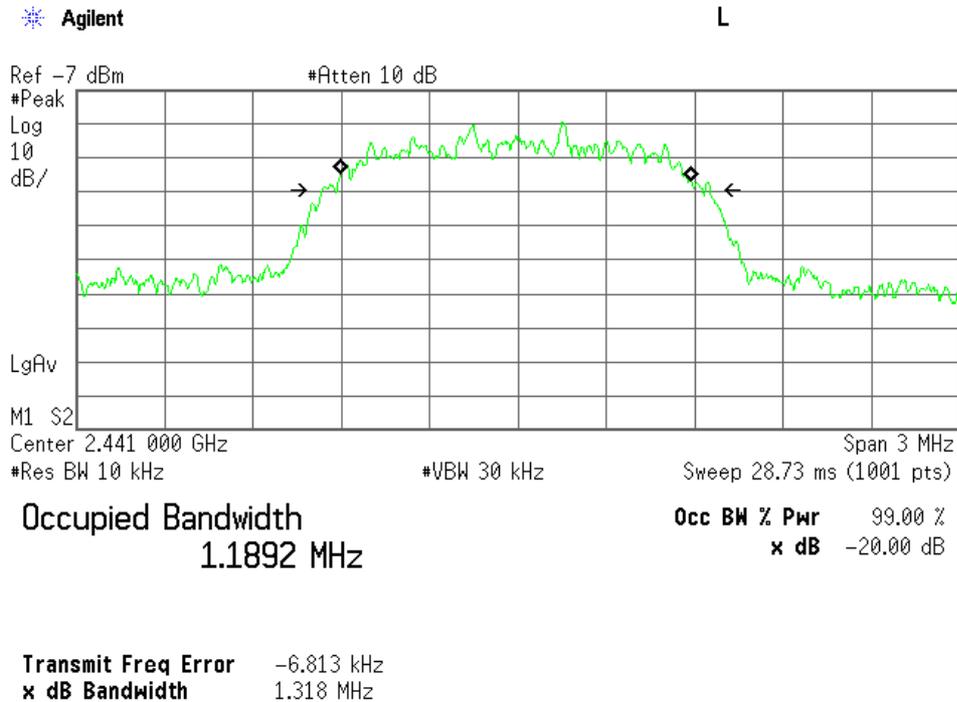
Occ BW % Pwr 99.00 %
x dB -20.00 dB

Transmit Freq Error -11.124 kHz
x dB Bandwidth 921.915 kHz

2)Packet Setting : 2DH5(Modulation type : pi/4-DQPSK)
Low Channel



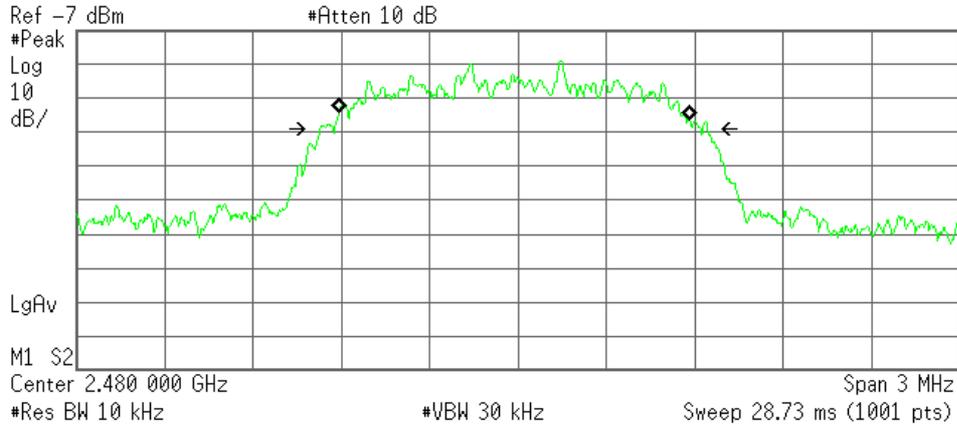
Middle Channel



High Channel

* Agilent

L

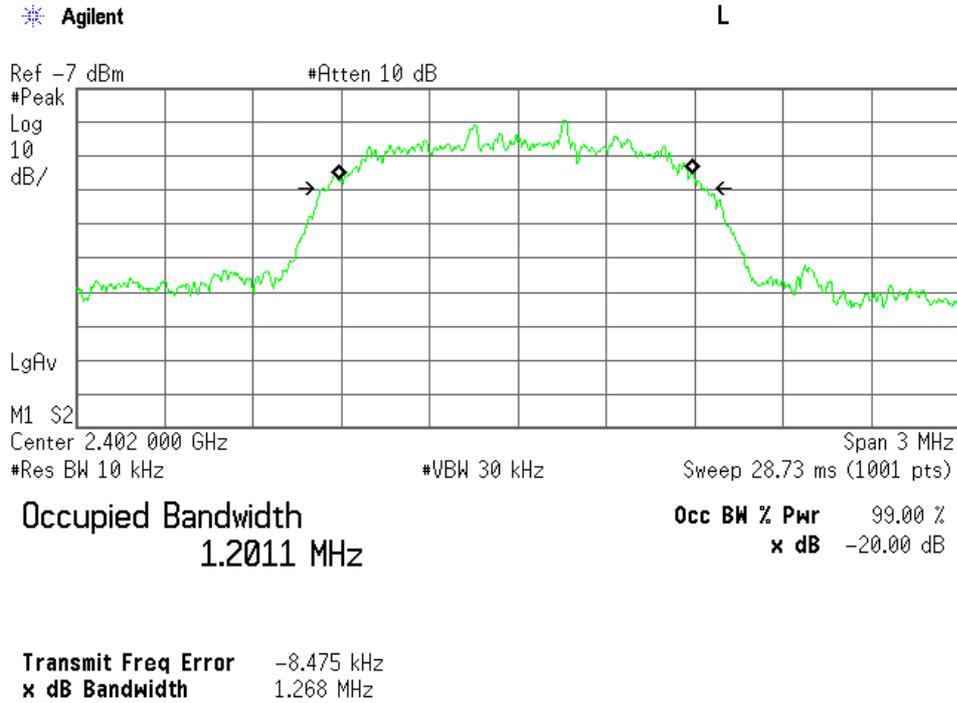


Occupied Bandwidth
1.1894 MHz

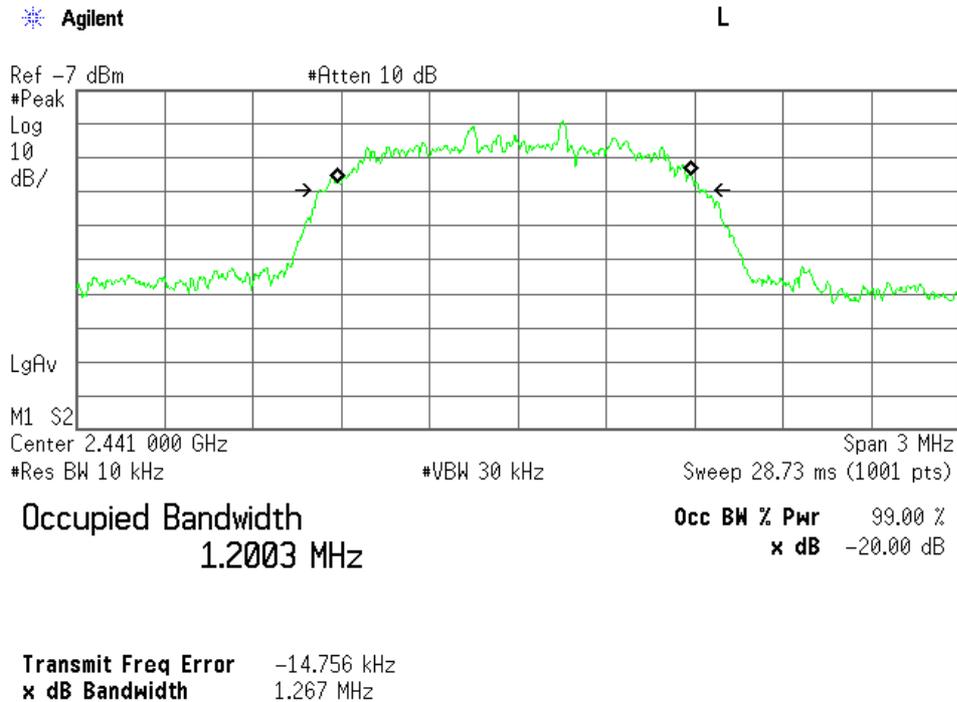
Occ BW % Pwr 99.00 %
x dB -20.00 dB

Transmit Freq Error -13.703 kHz
x dB Bandwidth 1.317 MHz

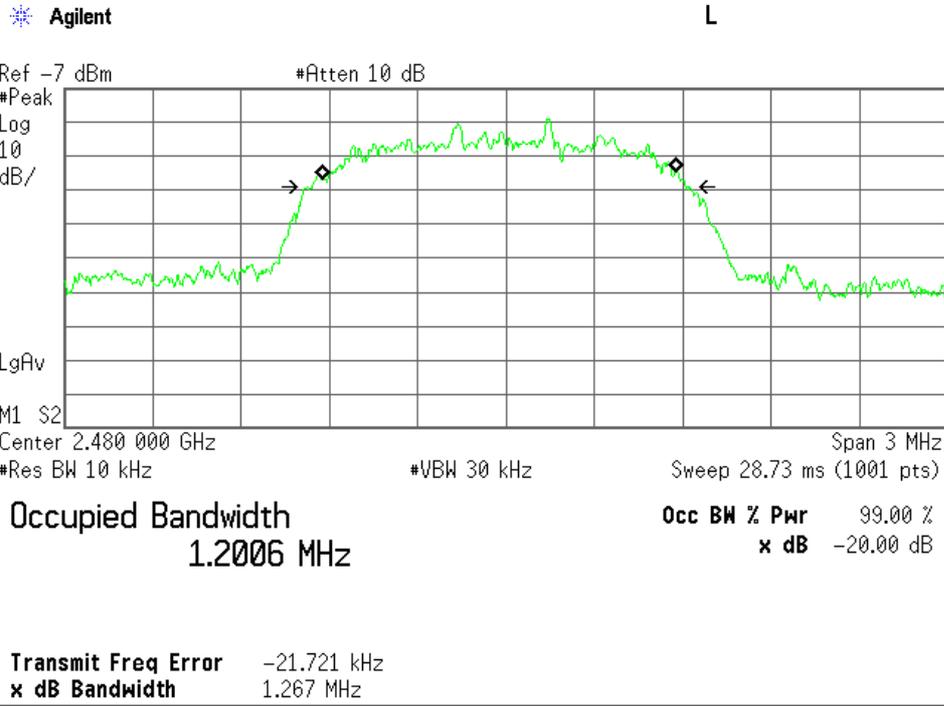
3) Packet Setting : 3 DH5 (Modulation type : 8DPSK)
Low Channel



Middle Channel



High Channel



Mode of EUT : Low Energy

Test Date : October 9, 2012

Temp.:25°C, Humi:47%

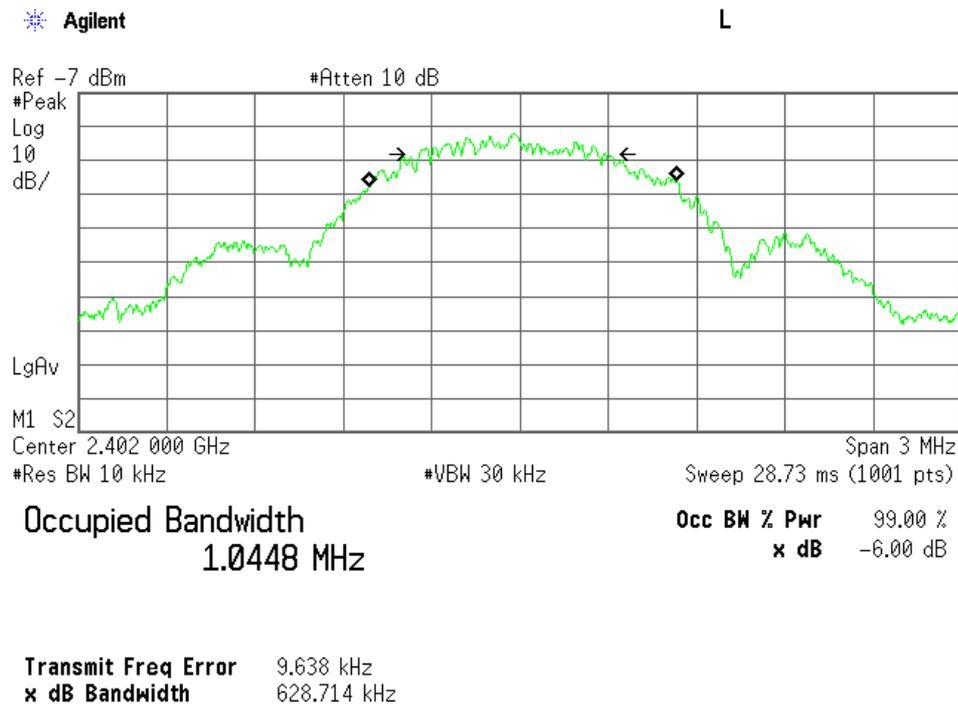
The resolution bandwidth was set to about 1% of emission bandwidth, -6dBc display line was placed on the screen (or 99% bandwidth), the occupied bandwidth is the delta frequency between the two points where the display line intersects the signal trace.

1)Packet Setting : LE (Modulation type : GFSK)

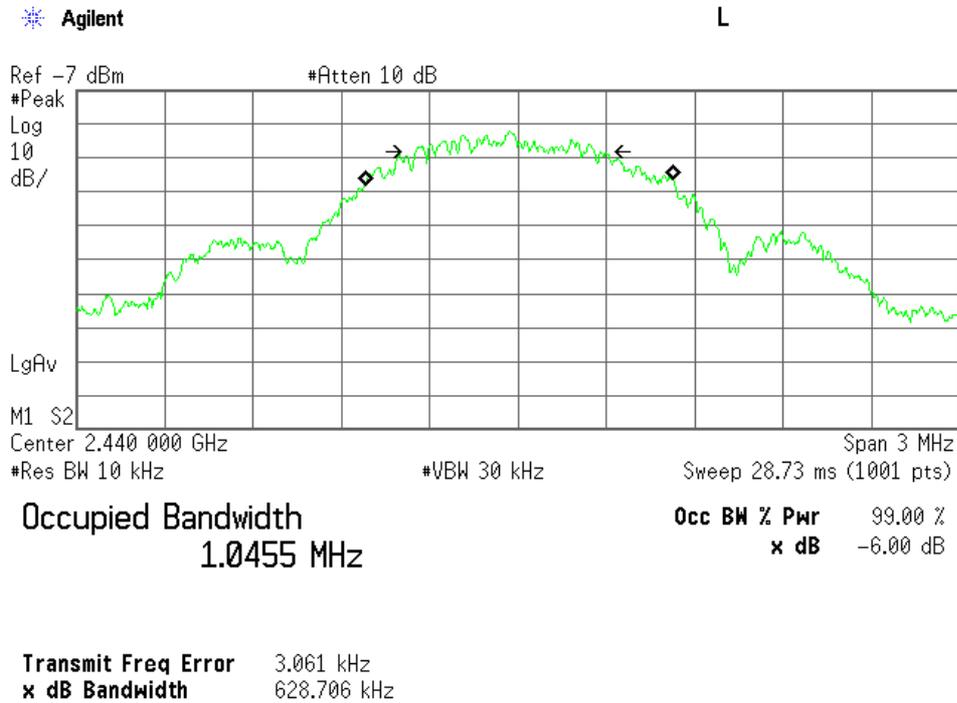
| Channel | Frequency (MHz) | 99% Bandwidth (kHz) | -6dBc Bandwidth (kHz) |
|---------|-----------------|---------------------|-----------------------|
| 00 | 2402.0 | 1044.8 | 628.7 |
| 19 | 2440.0 | 1045.5 | 628.7 |
| 39 | 2480.0 | 1045.6 | 629.3 |

1)Packet Setting : LE (Modulation type : GFSK)

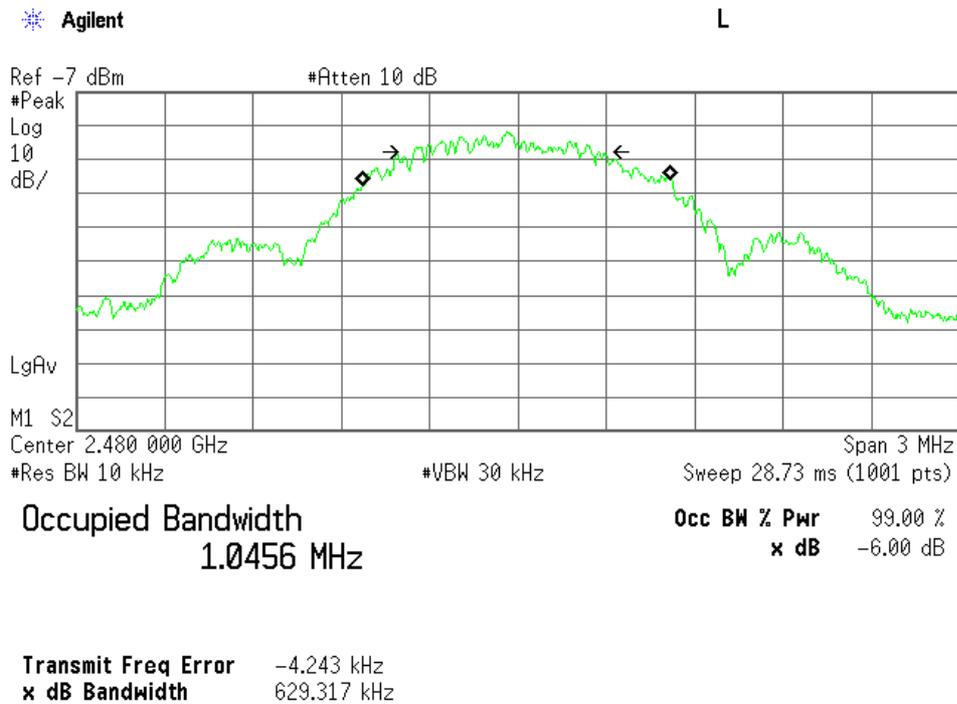
Low Channel



Middle Channel



High Channel



7.4 Dwell Time

For the requirements, - Applicable - Tested. - Not tested by applicant request.]
 - Not Applicable

For the limits, - Passed - Failed - Not judged

7.4.1 Worst Point and Measurement Uncertainty

Dwell Time is 308.1 msec
Dwell Time (Inquiry) is 64.5 msec
Dwell Time (AFH) is 308.1 msec

Uncertainty of Measurement Results +/-0.6 %(2σ)

Remarks : _____

7.4.2 Test Site

KITA-KANSAI Testing Center

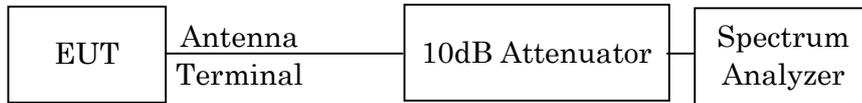
Test site : SAITO - Anechoic chamber (A1) - Measurement room (M1)
 - Measurement room (M2) - Measurement room (M3)
 - Shielded room (S1) - Shielded room (S2)
 - Shielded room (S3) - Shielded room (S4)

7.4.3 Test Instruments

| Type | Model | Manufacturer | ID No. | Last Cal. | Interval |
|-------------------|-------------|--------------|--------|-----------|----------|
| Spectrum Analyzer | E4446A | Agilent | A-39 | 2012/9 | 1 Year |
| Attenuator | 54A-10 | Weinschel | D-28 | 2012/9 | 1 Year |
| RF Cable | SUCOFLEX102 | SUHNER | C-52 | 2012/7 | 1 Year |

7.4.4 Test Method and Test Setup (Diagrammatic illustration)

The test system is shown as follows:



The setting of the spectrum analyzer are shown as follows:

| | |
|-----------------|-----------|
| Res. Bandwidth | 1 MHz |
| Video Bandwidth | 1 MHz |
| Span | Zero Span |

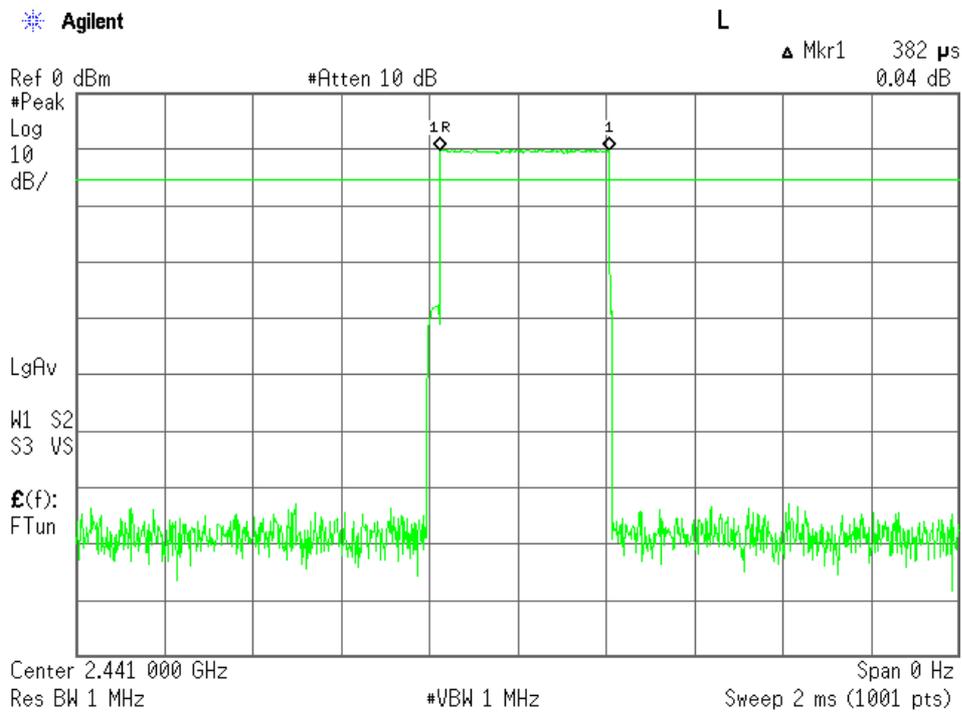
7.4.5 Test Data

Test Date : October 9, 2012

Temp.:25°C, Humi:47%

| Mode of EUT | Dwell Time (msec) |
|-------------|-------------------|
| DH1 | 122.2 |
| DH3 | 262.4 |
| DH5 | 308.1 |
| Inquiry | 64.5 |

DH1(Modulation type : GFSK)

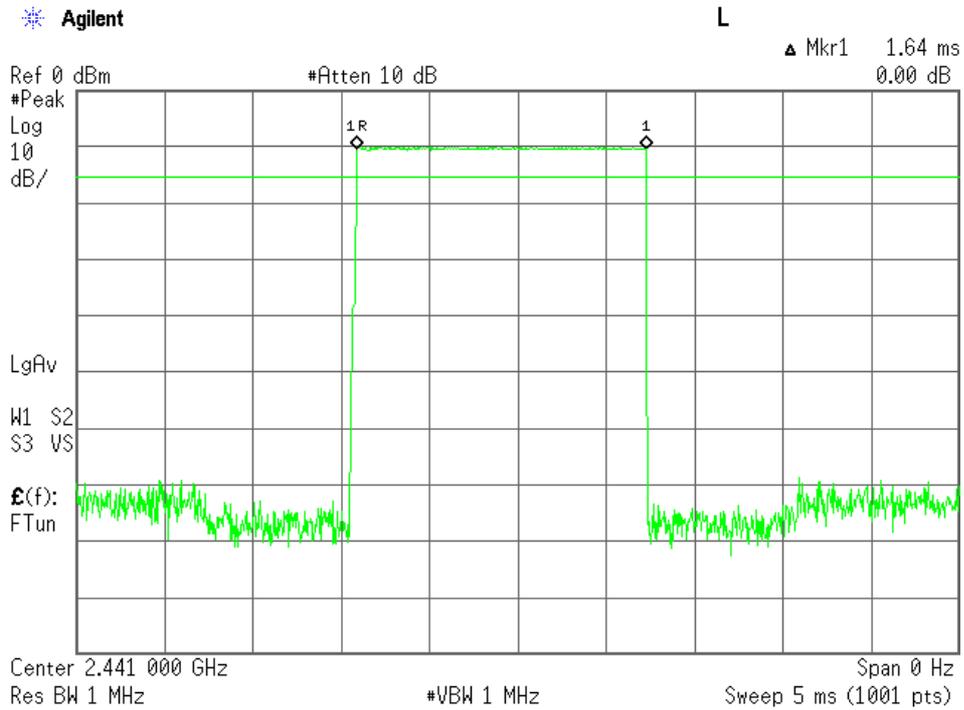


Note : The system makes worst case 1600 hops per second or 1 time slot has a length of 625 μs with 79 channels. A DH1 Packet need 1 time slot for transmitting and 1 time slot for receiving. Then the system makes worst case 800 hops per second with 79 channels. So the system has each channel 10.1266 times per second and so for 31.6 seconds the system have 320.0 times of appearance.

Each tx-time per appearance is 0.382 ms.

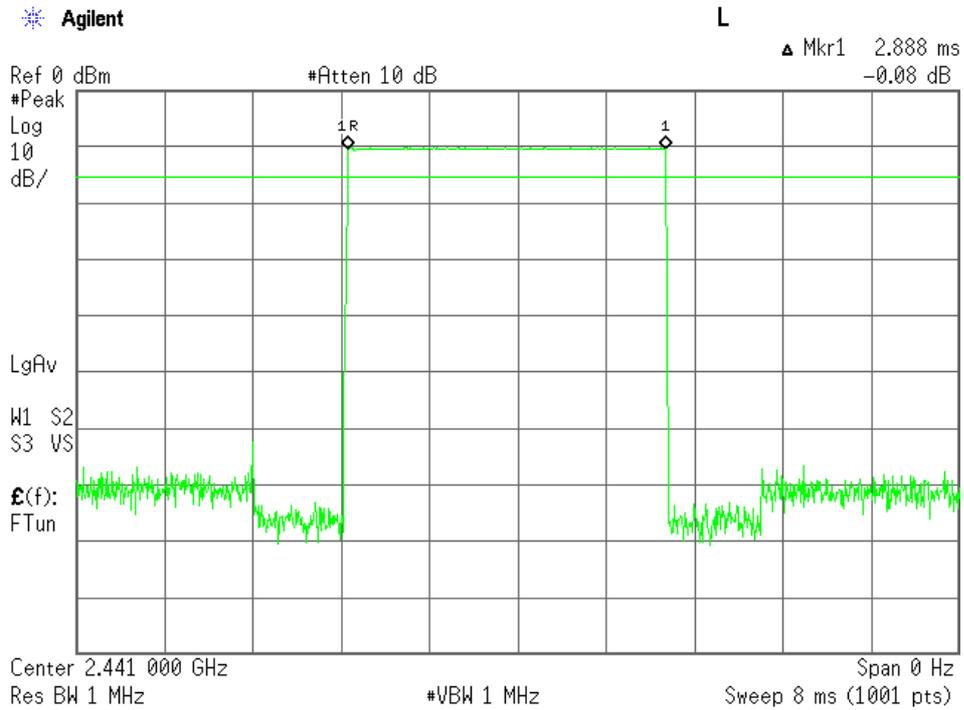
Dwell time = 320.0 * 0.382 = 122.2 ms

DH3(Modulation type : GFSK)



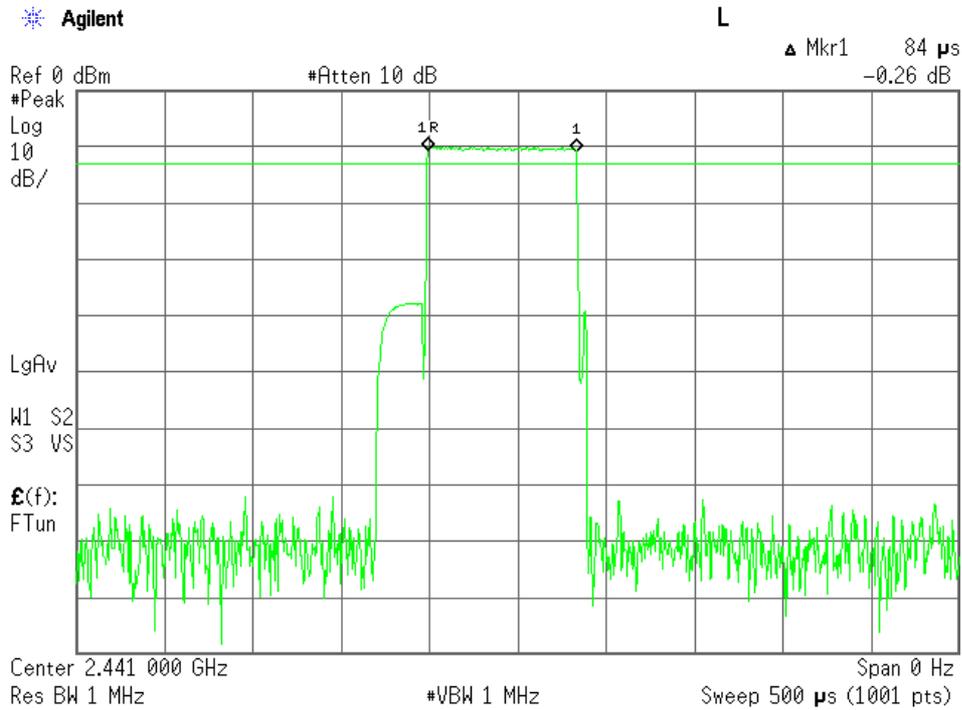
Note : A DH3 Packet need 3 time slot for transmitting and 1 time slot for receiving. Then the system makes worst case 400 hops per second with 79 channels. So the system have each channel 5.063 times per second and so for 31.6 seconds the system have 160.0 times of appearance. Each tx-time per appearance is 1.64 ms. Dwell time = 160.0 * 1.64 = 262.4 ms

DH5(Modulation type : GFSK)



Note : A DH5 Packet need 5 time slot for transmitting and 1 time slot for receiving. Then the system makes worst case 266.667 hops per second with 79 channels. So the system have each channel 3.3755 times per second and so for 31.6 seconds the system have 106.7 times of appearance. Each tx-time per appearance is 2.888 ms.
 Dwell time = 106.7 * 2.888 = 308.1 ms

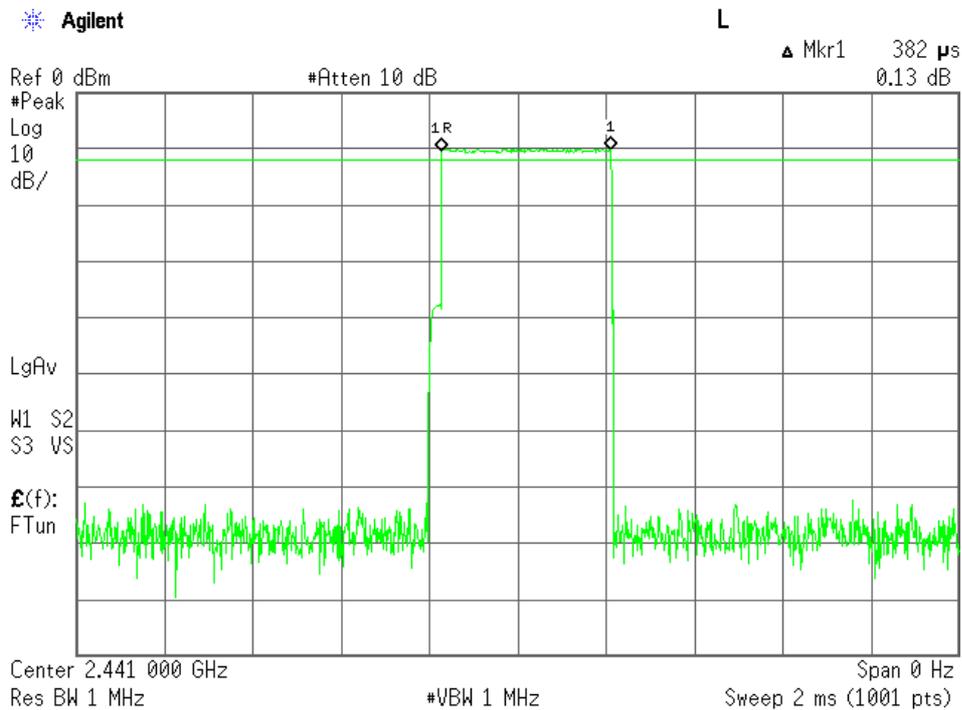
Inquiry



Note : The system have 32 hopping channel in Inquiry mode.
 The time period = $32 * 0.4 = 12.8$ seconds
 In maximum case the Bluetooth system have three blocks of 2560 ms in 12.8 s period. One block has 256 burst at each hopping channel.
 Each tx-time per appearance is 0.084 ms.
 Dwell time = $0.084 * 256 * 3 = 64.5$ ms

| Mode of EUT | Dwell Time (msec) |
|-------------|-------------------|
| DH1(AFH) | 122.2 |
| DH3(AFH) | 262.4 |
| DH5(AFH) | 308.1 |

DH1(AFH mode, Modulation type : GFSK)

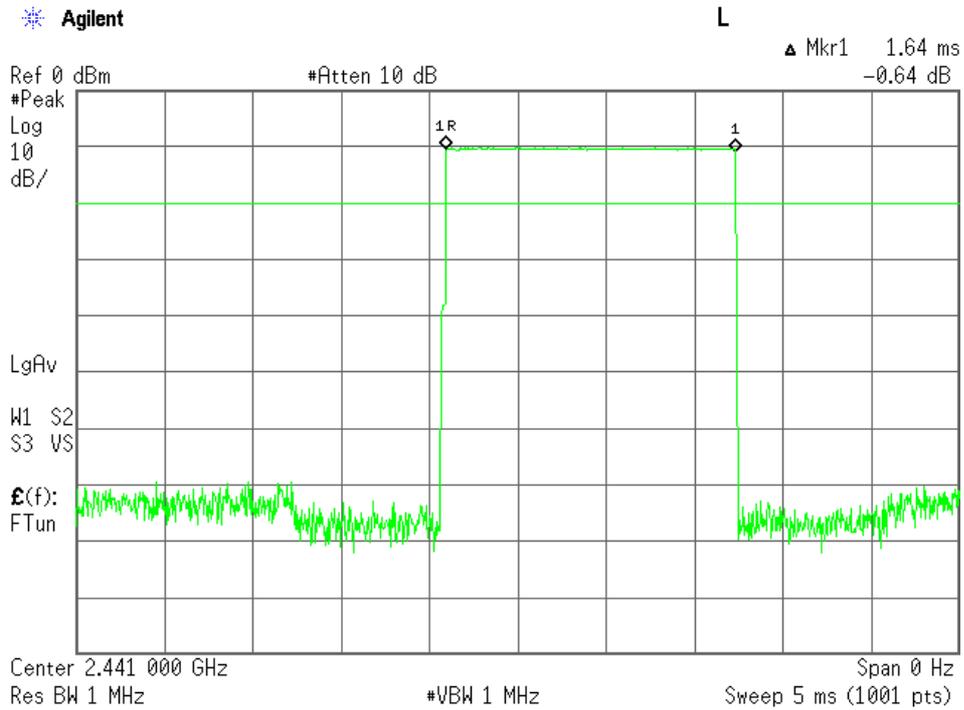


Note : The system makes worst case 1600 hops per second or 1 time slot has a length of 625 μs with 79 channels. A DH1 Packet need 1 time slot for transmitting and 1 time slot for receiving. Then the system makes worst case 800 hops per second with 20 channels. So the system has each channel 40 times per second and so for 8 seconds the system have 320.0 times of appearance.

Each tx-time per appearance is 0.382 ms.

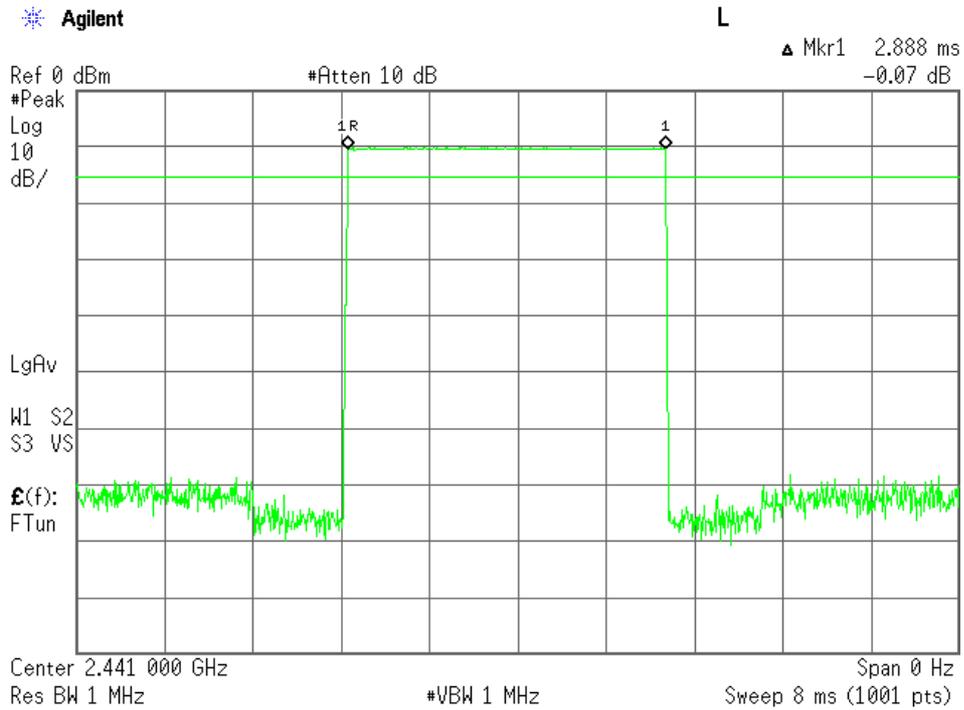
Dwell time = 320.0 * 0.382 = 122.2 ms

DH3(AFH mode, Modulation type : GFSK)



Note : A DH3 Packet need 3 time slot for transmitting and 1 time slot for receiving. Then the system makes worst case 400 hops per second with 20 channels. So the system have each channel 20 times per second and so for 8 seconds the system have 160.0 times of appearance. Each tx-time per appearance is 1.64 ms.
Dwell time = 160.0 * 1.64 = 262.4 ms

DH5(AFH mode, Modulation type : GFSK)



Note : A DH5 Packet need 5 time slot for transmitting and 1 time slot for receiving. Then the system makes worst case 266.667 hops per second with 20 channels. So the system have each channel 13.33335 times per second and so for 8 seconds the system have 106.7 times of appearance. Each tx-time per appearance is 2.888 ms.
 Dwell time = 106.7 * 2.888 = 308.1 ms

7.5 Peak Output Power(Conduction)

For the requirements, - Applicable - Tested. - Not tested by applicant request.]
 - Not Applicable

For the limits, - Passed - Failed - Not judged

7.5.1 Worst Point and Measurement Uncertainty

Peak Output Power is 2.97 dBm at 2441.0 MHz

Uncertainty of Measurement Results at Amplitude +/-0.8 dB(2 σ)

Remarks : _____

7.5.2 Test Site

KITA-KANSAI Testing Center

Test site : SAITO

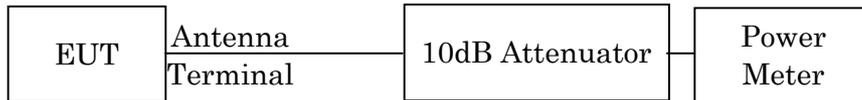
| | |
|--|--|
| <input type="checkbox"/> - Anechoic chamber (A1) | <input type="checkbox"/> - Measurement room (M1) |
| <input type="checkbox"/> - Measurement room (M2) | <input type="checkbox"/> - Measurement room (M3) |
| <input type="checkbox"/> - Shielded room (S1) | <input type="checkbox"/> - Shielded room (S2) |
| <input type="checkbox"/> - Shielded room (S3) | <input checked="" type="checkbox"/> - Shielded room (S4) |

7.5.3 Test Instruments

| Type | Model | Manufacturer | ID No. | Last Cal. | Interval |
|--------------|-------------|--------------|--------|-----------|----------|
| Power Meter | N1911A | Agilent | B-63 | 2012/7 | 1 Year |
| Power Sensor | N1921A | Agilent | B-64 | 2012/7 | 1 Year |
| Attenuator | 54A-10 | Weinschel | D-28 | 2012/9 | 1 Year |
| RF Cable | SUCOFLEX102 | SUHNER | C-52 | 2012/7 | 1 Year |

7.5.4 Test Method and Test Setup (Diagrammatic illustration)

The Conducted RF Power Output was measured with a power meter, one 10dB attenuator and a short, low loss cable.



7.5.5 Test Data

1)DH5(Modulation type : GFSK)

Test Date: October 9, 2012
Temp.: 25 °C, Humi: 47 %

| Transmitting Frequency | | Correction Factor [dB] | Meter Reading [dBm] | Conducted Peak Output Power | | Limits [dBm] | Margin [dB] |
|------------------------|-------|---------------------------|------------------------|-----------------------------|------|-----------------|----------------|
| CH | [MHz] | | | [dBm] | [mW] | | |
| 00 | 2402 | 9.89 | -10.55 | -0.66 | 0.86 | 20.97 | +21.63 |
| 39 | 2441 | 9.89 | -9.96 | -0.07 | 0.98 | 20.97 | +21.04 |
| 78 | 2480 | 9.89 | -10.04 | -0.15 | 0.97 | 20.97 | +21.12 |

| | | |
|---|---|---------------------|
| Calculated result at 2441.000 MHz, as the worst point shown on underline: | | |
| Correction Factor | = | 9.89 dB |
| +) Meter Reading | = | -9.96 dBm |
| Result | = | -0.07 dBm = 0.98 mW |
| Minimum Margin: 20.97 - -0.07 = 21.04 (dB) | | |

| | |
|---|------------|
| NOTES | |
| 1. The correction factor shows the attenuation pad loss including the short, low loss cable or adapter. | |
| 2. Setting of measuring instrument(s) : | |
| Detector Function | Video B.W. |
| Peak | Off |

2)2DH5(Modulation type : pi/4-DQPSK)

Test Date: October 9, 2012

Temp.: 25 °C, Humi: 47 %

| CH | Transmitting Frequency | Correction Factor [dB] | Meter Reading [dBm] | Conducted Peak Output Power | | Limits [dBm] | Margin [dB] |
|----|------------------------|---------------------------|------------------------|-----------------------------|------|-----------------|----------------|
| | [MHz] | | | [dBm] | [mW] | | |
| 00 | 2402 | 9.89 | -7.96 | 1.93 | 1.56 | 20.97 | +19.04 |
| 39 | 2441 | 9.89 | -7.30 | 2.59 | 1.82 | 20.97 | +18.38 |
| 78 | 2480 | 9.89 | -7.40 | 2.49 | 1.77 | 20.97 | +18.48 |

Calculated result at 2441.000 MHz, as the worst point shown on underline:

| | | |
|-------------------|---|--------------------|
| Correction Factor | = | 9.89 dB |
| +) Meter Reading | = | -7.30 dBm |
| Result | = | 2.59 dBm = 1.82 mW |

Minimum Margin: 20.97 - 2.59 = 18.38 (dB)

NOTES

1. The correction factor shows the attenuation pad loss including the short, low loss cable or adapter.
2. Setting of measuring instrument(s) :

| | |
|-------------------|------------|
| Detector Function | Video B.W. |
| Peak | Off |

3)3DH5(Modulation type : 8DPSK)

Test Date: October 9, 2012

Temp.: 25 °C, Humi: 47 %

| CH | Transmitting Frequency | | Correction Factor [dB] | Meter Reading [dBm] | Conducted Peak Output Power | | Limits [dBm] | Margin [dB] |
|----|------------------------|--|------------------------|---------------------|-----------------------------|------|--------------|-------------|
| | [MHz] | | | | [dBm] | [mW] | | |
| 00 | 2402 | | 9.89 | -7.58 | 2.31 | 1.70 | 20.97 | +18.66 |
| 39 | 2441 | | 9.89 | -6.92 | 2.97 | 1.98 | 20.97 | +18.00 |
| 78 | 2480 | | 9.89 | -7.03 | 2.86 | 1.93 | 20.97 | +18.11 |

Calculated result at 2441.000 MHz, as the worst point shown on underline:

| | | |
|-------------------|---|--------------------|
| Correction Factor | = | 9.89 dB |
| +) Meter Reading | = | -6.92 dBm |
| Result | = | 2.97 dBm = 1.98 mW |

Minimum Margin: 20.97 - 2.97 = 18.00 (dB)

NOTES

1. The correction factor shows the attenuation pad loss including the short, low loss cable or adapter.
2. Setting of measuring instrument(s) :

| | |
|-------------------|------------|
| Detector Function | Video B.W. |
| Peak | Off |

4)LE(Modulation type : GFSK)

Test Date: October 9, 2012

Temp.: 25 °C, Humi: 47 %

| CH | Transmitting Frequency | | Correction Factor [dB] | Meter Reading [dBm] | Conducted Peak Output Power | | Limits [dBm] | Margin [dB] |
|----|------------------------|--|---------------------------|------------------------|-----------------------------|------|-----------------|----------------|
| | [MHz] | | | | [dBm] | [mW] | | |
| 00 | 2402 | | 9.89 | -11.26 | -1.37 | 0.73 | 30.00 | +31.37 |
| 19 | 2440 | | 9.89 | -10.67 | -0.78 | 0.84 | 30.00 | +30.78 |
| 39 | 2480 | | 9.89 | -10.85 | -0.96 | 0.80 | 30.00 | +30.96 |

Calculated result at 2440.000 MHz, as the worst point shown on underline:

| | | |
|-------------------|---|---------------------|
| Correction Factor | = | 9.89 dB |
| +) Meter Reading | = | -10.67 dBm |
| Result | = | -0.78 dBm = 0.84 mW |

Minimum Margin: 30.00 - -0.78 = 30.78 (dB)

NOTES

1. The correction factor shows the attenuation pad loss including the short, low loss cable or adapter.
2. Setting of measuring instrument(s) :

| | |
|-------------------|------------|
| Detector Function | Video B.W. |
| Peak | Off |

7.6 Peak Power Density(Conduction)

For the requirements, - Applicable - Tested. - Not tested by applicant request.]
 - Not Applicable

For the limits, - Passed - Failed - Not judged

7.6.1 Worst Point and Measurement Uncertainty

Peak Power Density is -15.98 dBm at 2440.0 MHz

Uncertainty of Measurement Results at Amplitude +/-1.2 dB(2 σ)

Remarks : _____

7.6.2 Test Site

KITA-KANSAI Testing Center

Test site : SAITO

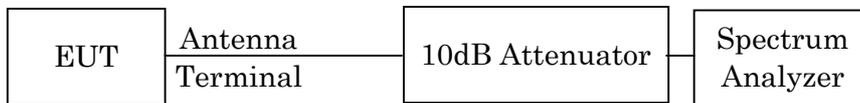
| | |
|--|--|
| <input type="checkbox"/> - Anechoic chamber (A1) | <input type="checkbox"/> - Measurement room (M1) |
| <input type="checkbox"/> - Measurement room (M2) | <input type="checkbox"/> - Measurement room (M3) |
| <input type="checkbox"/> - Shielded room (S1) | <input type="checkbox"/> - Shielded room (S2) |
| <input type="checkbox"/> - Shielded room (S3) | <input checked="" type="checkbox"/> - Shielded room (S4) |

7.6.3 Test Instruments

| Type | Model | Manufacturer | ID No. | Last Cal. | Interval |
|-------------------|-------------|--------------|--------|-----------|----------|
| Spectrum Analyzer | E4446A | Agilent | A-39 | 2012/9 | 1 Year |
| Attenuator | 54A-10 | Weinschel | D-28 | 2012/9 | 1 Year |
| RF Cable | SUCOFLEX102 | SUHNER | C-52 | 2012/7 | 1 Year |

7.6.4 Test Method and Test Setup (Diagrammatic illustration)

The test system is shown as follows:



7.6.5 Test Data

LE(Modulation type : GFSK)

Test Date: October 9, 2012
Temp.: 25 °C. Humi: 47 %

| CH | Transmitting Frequency | | Correction Factor [dB] | BWCF [dB] | Meter Reading [dBm] | Conducted Peak Power Density | | Limits [dBm] | Margin [dB] |
|----|------------------------|------|------------------------|-----------|---------------------|------------------------------|------|--------------|-------------|
| | [MHz] | [dB] | | | | [dBm] | [mW] | | |
| 00 | 2402 | 9.89 | -15.20 | -11.26 | -16.57 | 0.02 | 8.00 | +24.57 | |
| 19 | 2440 | 9.89 | -15.20 | -10.67 | -15.98 | 0.03 | 8.00 | +23.98 | |
| 39 | 2480 | 9.89 | -15.20 | -10.85 | -16.16 | 0.02 | 8.00 | +24.16 | |

Calculated result at 2440.000 MHz, as the worst point shown on underline:

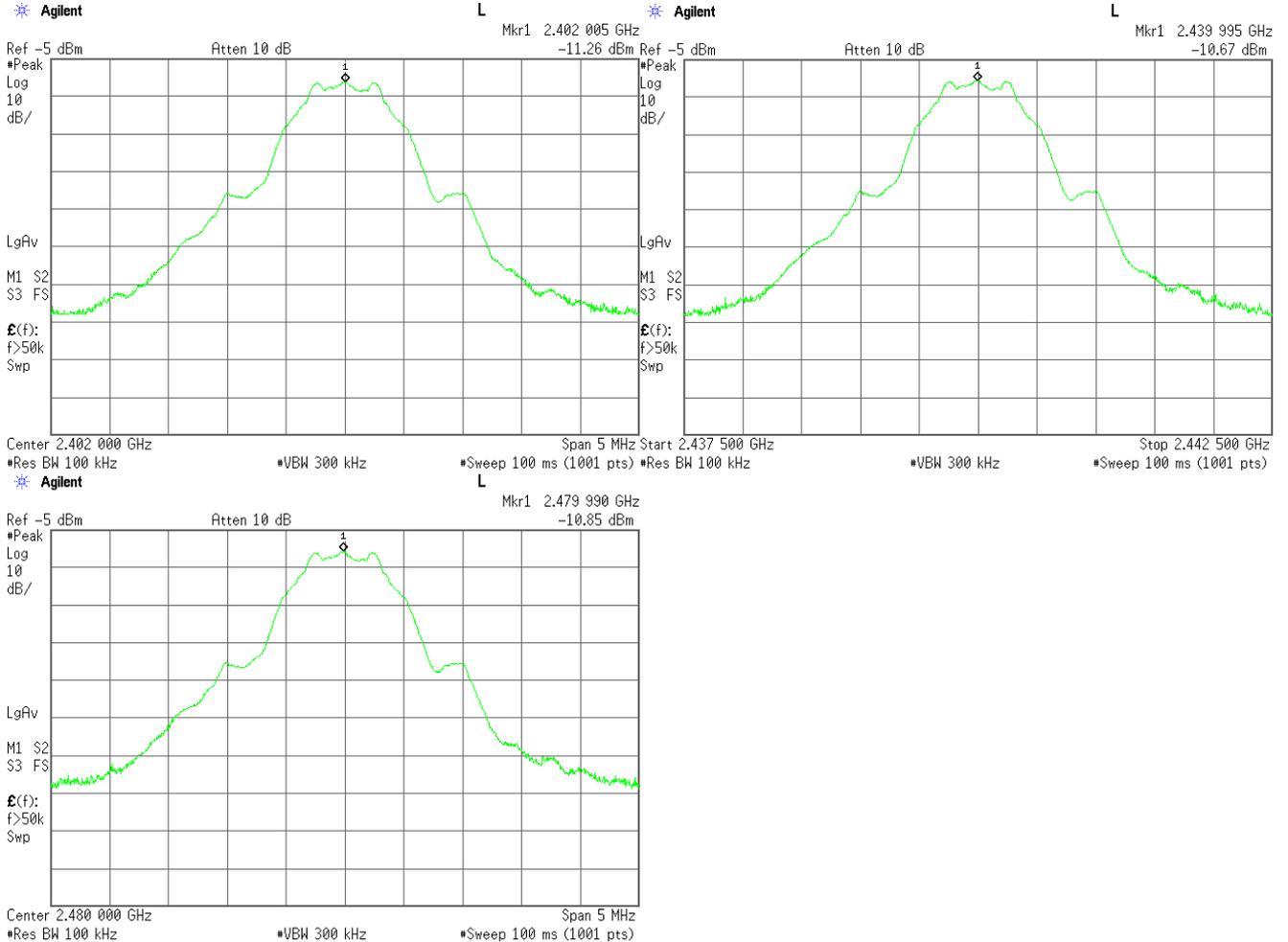
| | | |
|-------------------|---|----------------------|
| Correction Factor | = | 9.89 dB |
| BWCF | = | -15.20 dB |
| +) Meter Reading | = | -10.67 dBm |
| Result | = | -15.98 dBm = 0.03 mW |

Minimum Margin: 8.00 - -15.98 = 23.98 (dB)

NOTES

- The correction factor shows the attenuation pad loss including the short, low loss cable or adapter.
- BWCF(bandwidth correction factor) = $10 \log (3 \text{ kHz}/100 \text{ kHz}) = -15.2 \text{ dB}$
- Setting of measuring instrument(s) :

| Detector Function | RES B.W. | Video B.W. |
|-------------------|----------|------------|
| Peak | 100kHz | 300kHz |



7.7 Spurious Emissions(Conduction)

For the requirements, - Applicable - Tested. - Not tested by applicant request.]
 - Not Applicable

For the limits, - Passed - Failed - Not judged

7.7.1 Worst Point and Measurement Uncertainty

| | | | |
|------------------------------------|---------------|---------------|-----------------|
| Uncertainty of Measurement Results | 9 kHz – 1GHz | <u>+/-1.0</u> | dB(2 σ) |
| | 1GHz – 18GHz | <u>+/-1.2</u> | dB(2 σ) |
| | 18GHz – 40GHz | <u>+/-1.6</u> | dB(2 σ) |

Remarks : _____

7.7.2 Test Site

KITA-KANSAI Testing Center

Test site : SAITO

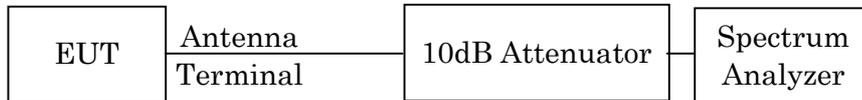
| | |
|--|--|
| <input type="checkbox"/> - Anechoic chamber (A1) | <input type="checkbox"/> - Measurement room (M1) |
| <input type="checkbox"/> - Measurement room (M2) | <input type="checkbox"/> - Measurement room (M3) |
| <input type="checkbox"/> - Shielded room (S1) | <input type="checkbox"/> - Shielded room (S2) |
| <input type="checkbox"/> - Shielded room (S3) | <input checked="" type="checkbox"/> - Shielded room (S4) |

7.7.3 Test Instruments

| Type | Model | Manufacturer | ID No. | Last Cal. | Interval |
|-------------------|-------------|--------------|--------|-----------|----------|
| Spectrum Analyzer | E4446A | Agilent | A-39 | 2012/9 | 1 Year |
| Attenuator | 54A-10 | Weinschel | D-28 | 2012/9 | 1 Year |
| RF Cable | SUCOFLEX102 | SUHNER | C-52 | 2012/7 | 1 Year |

7.7.4 Test Method and Test Setup (Diagrammatic illustration)

The test system is shown as follows:



The setting of the spectrum analyzer are shown as follows:

| | | |
|-----------------|-----------------|-----------|
| Frequency Range | 30 MHz - 25 GHz | Band-Edge |
| Res. Bandwidth | 100 kHz | 100 kHz |
| Video Bandwidth | 300 kHz | 300 kHz |
| Sweep Time | AUTO | AUTO |
| Trace | Maxhold | Maxhold |

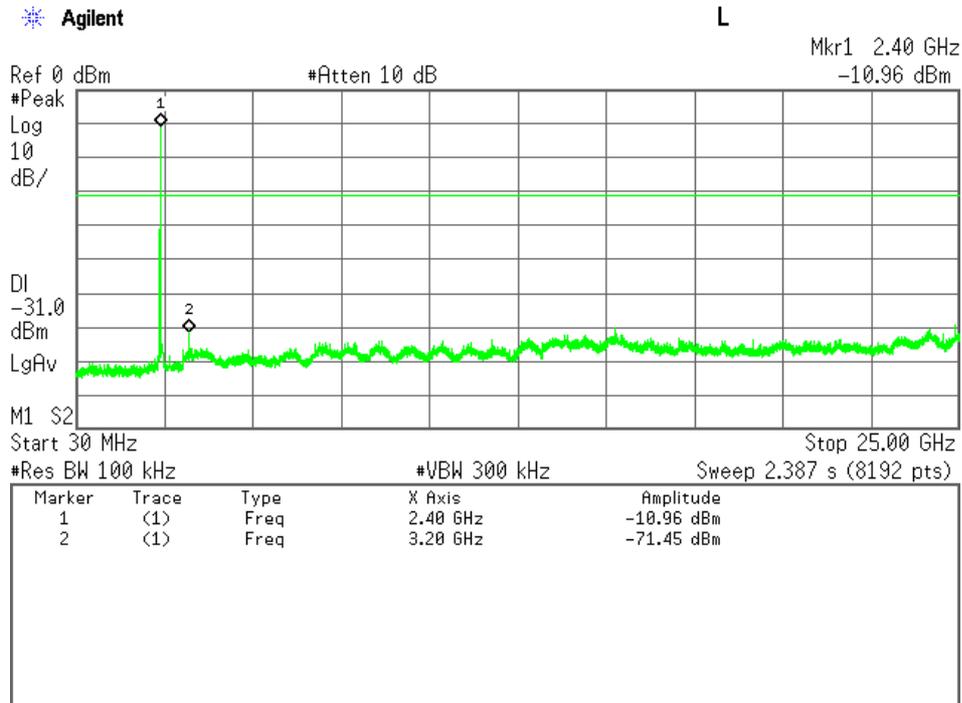
7.7.5 Test Data

Test Date : October 9, 2012

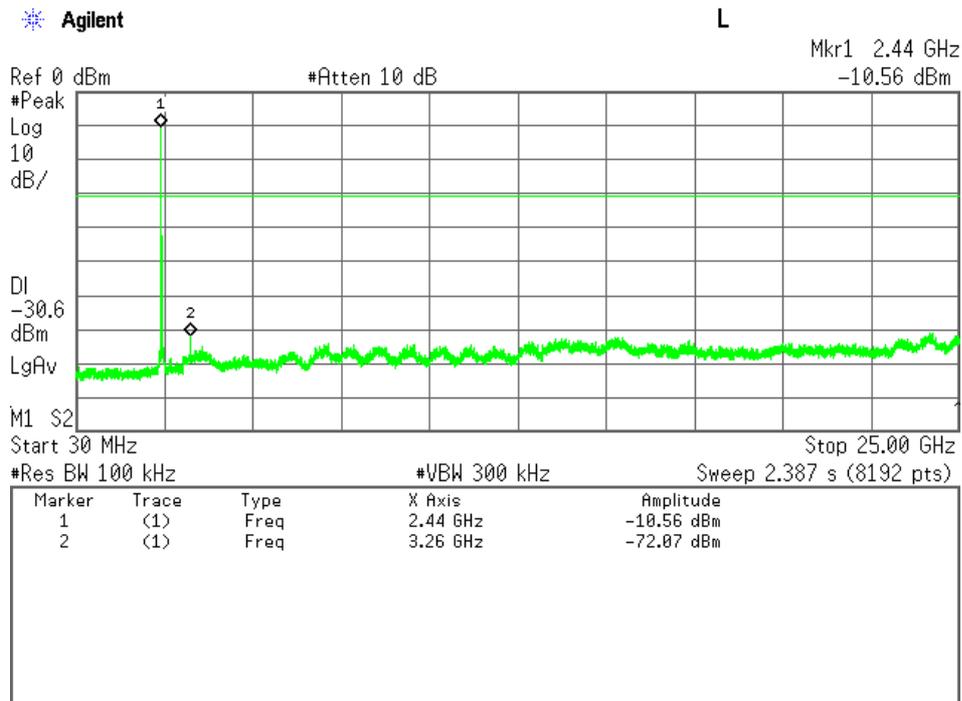
Temp.:25°C, Humi:47%

1) Mode of EUT : Standard+EDR

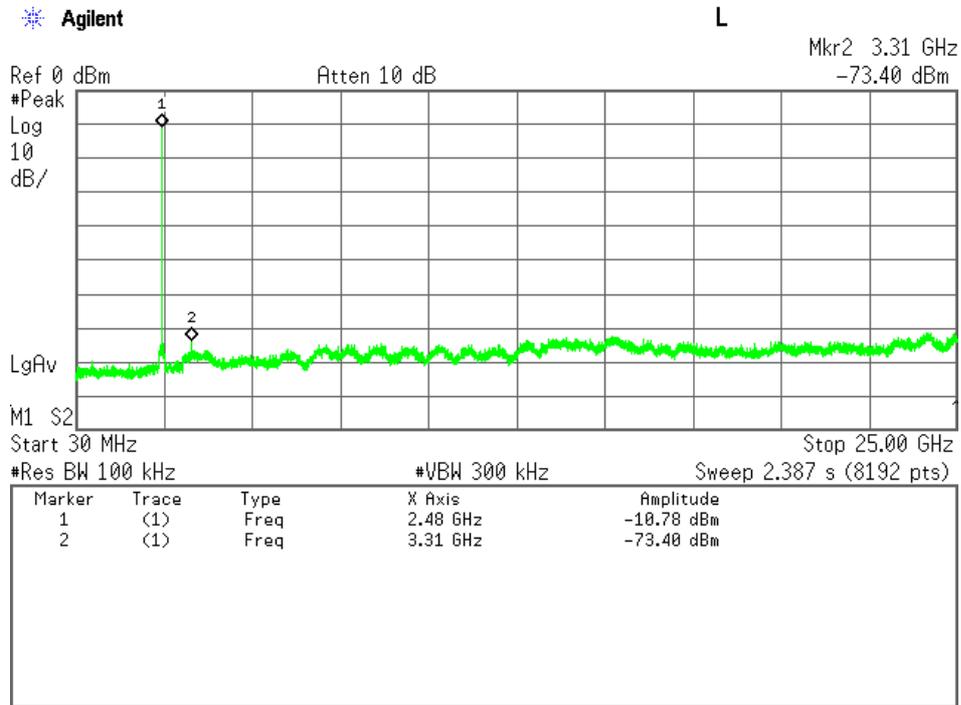
Low Channel



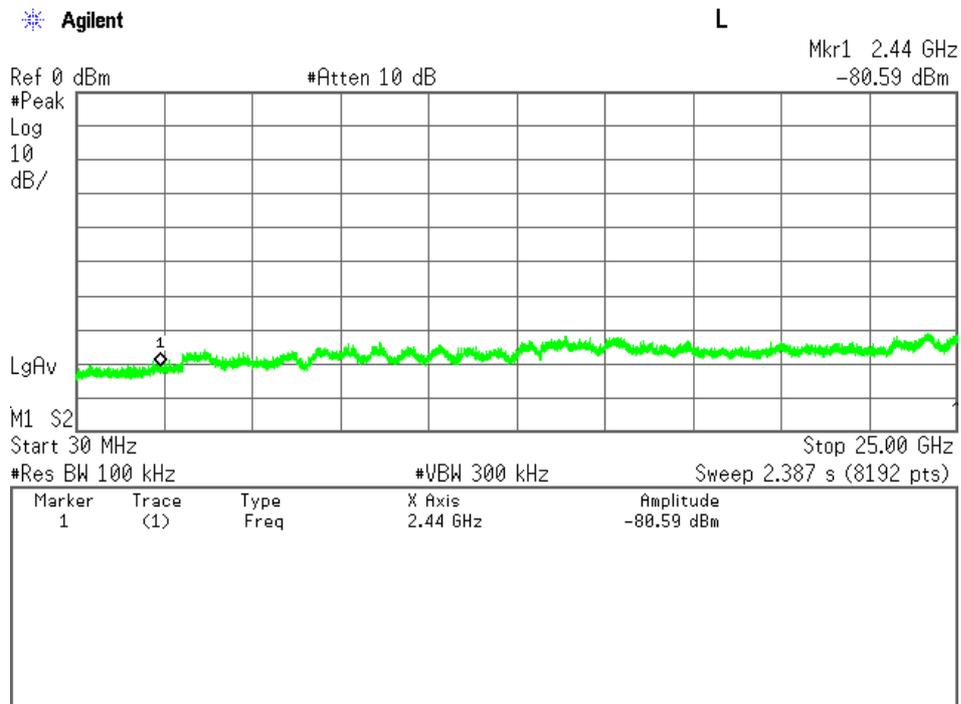
Middle Channel



High Channel

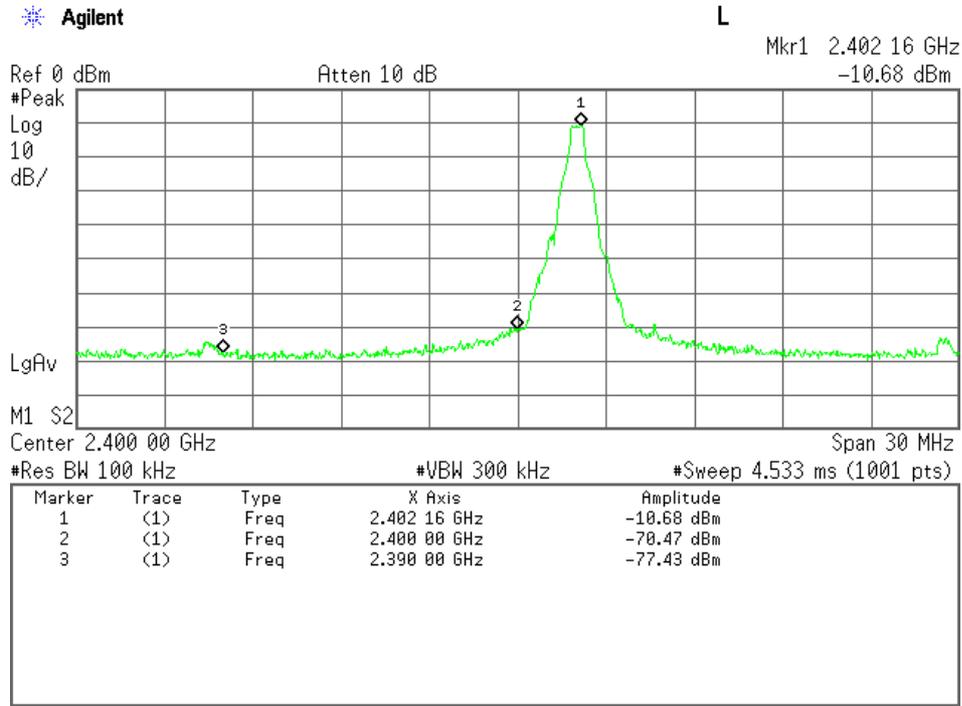


Receiving(Middle Channel)

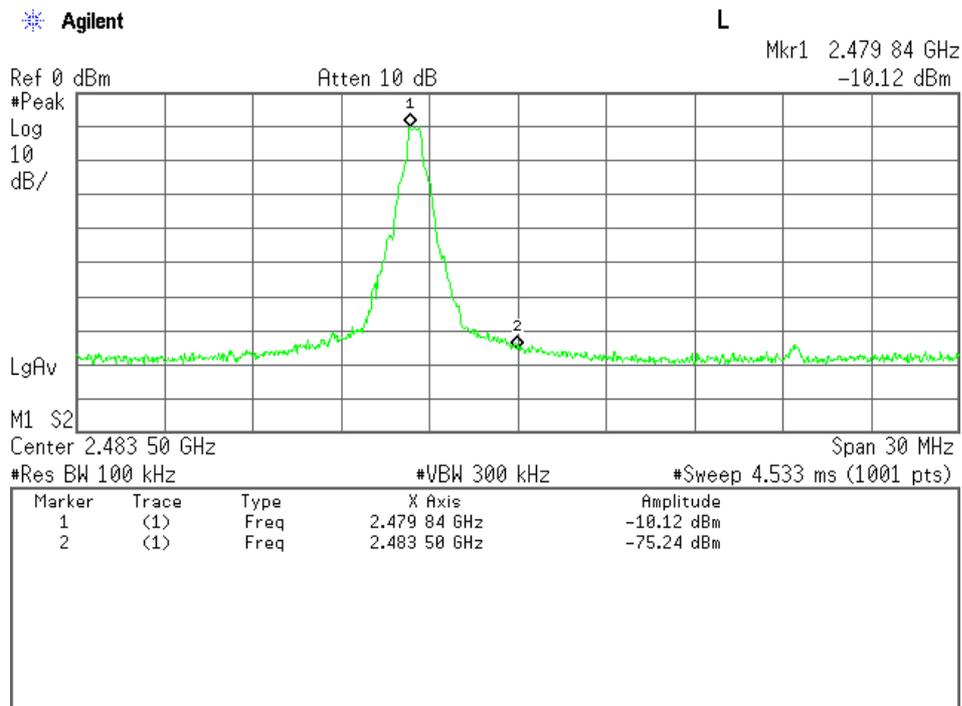


Band-Edge Emission

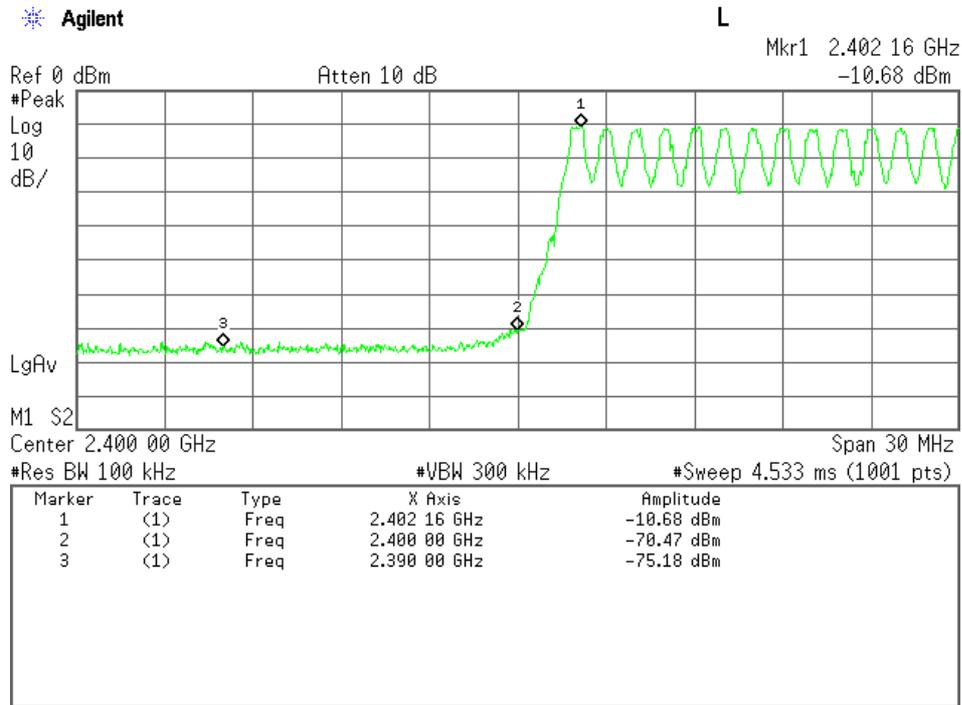
Low Channel(Hopping off), Band-Edge Emission



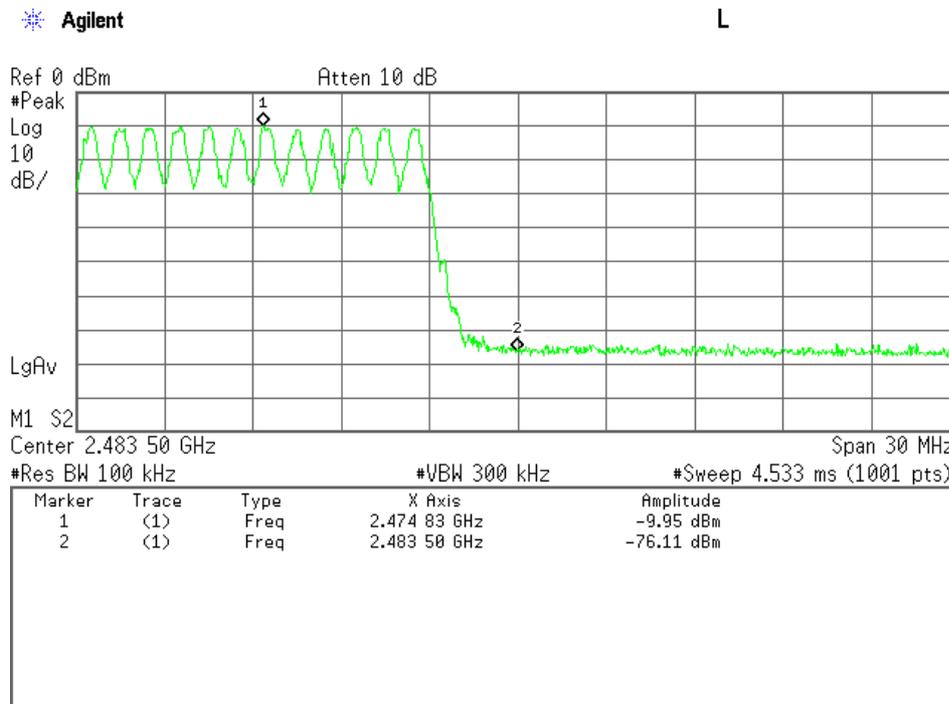
High Channel(Hopping off), Band-Edge Emission



Low Channel(Hopping on), Band-Edge Emission

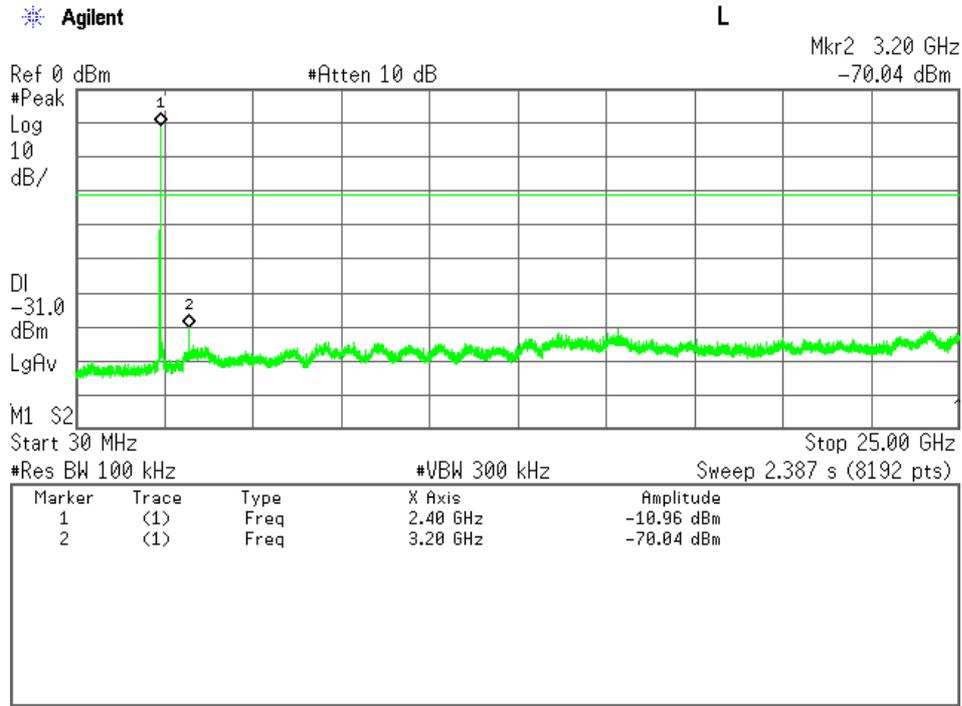


High Channel(Hopping on), Band-Edge Emission

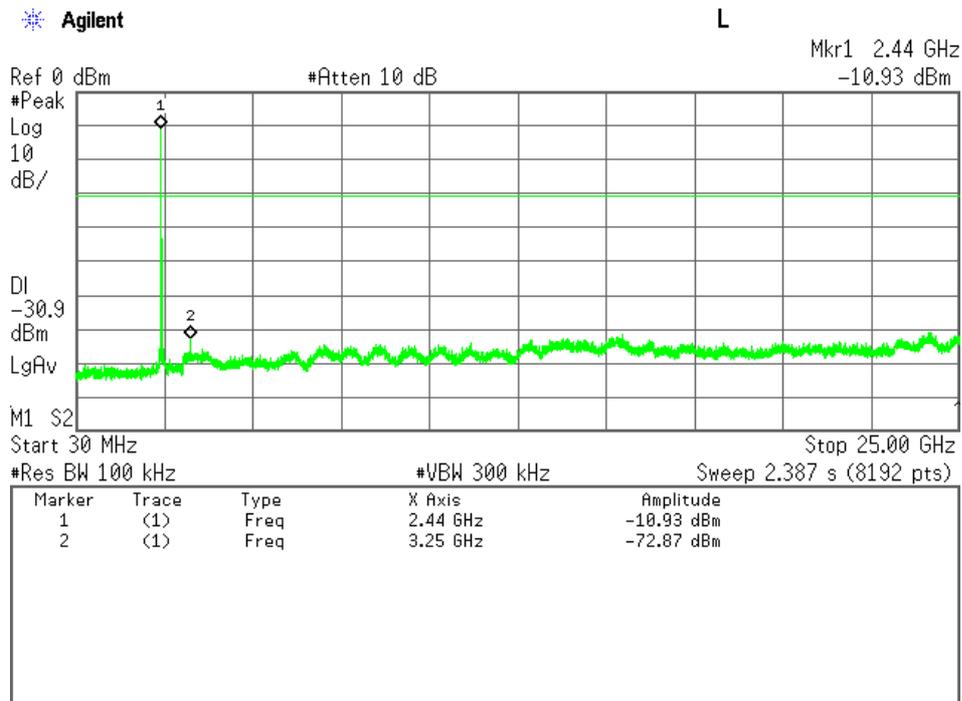


2) Mode of EUT : Low Energy

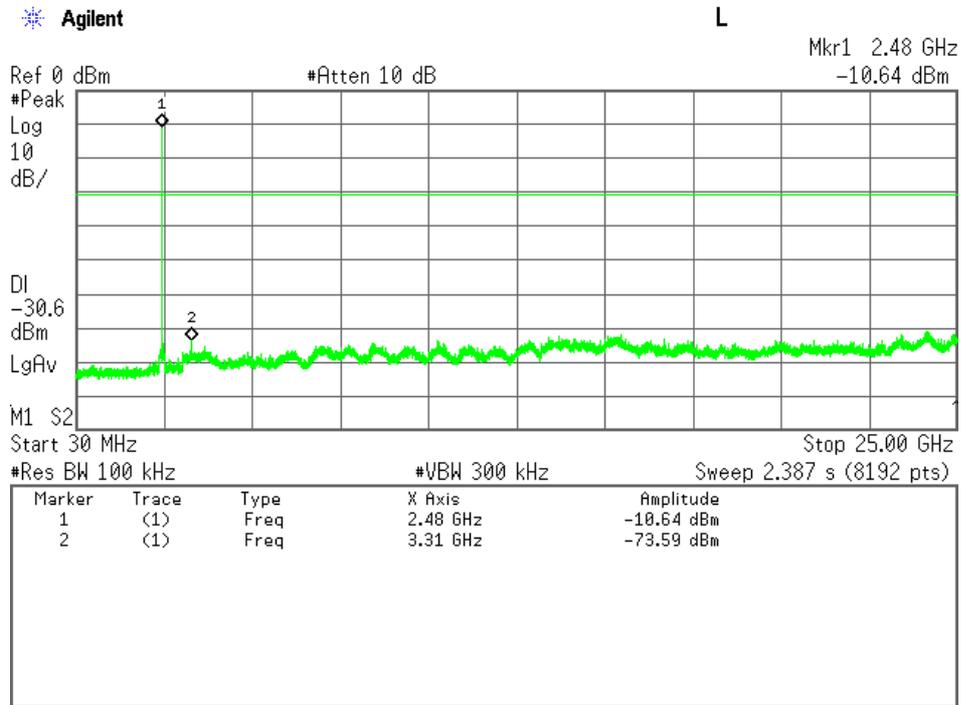
Low Channel



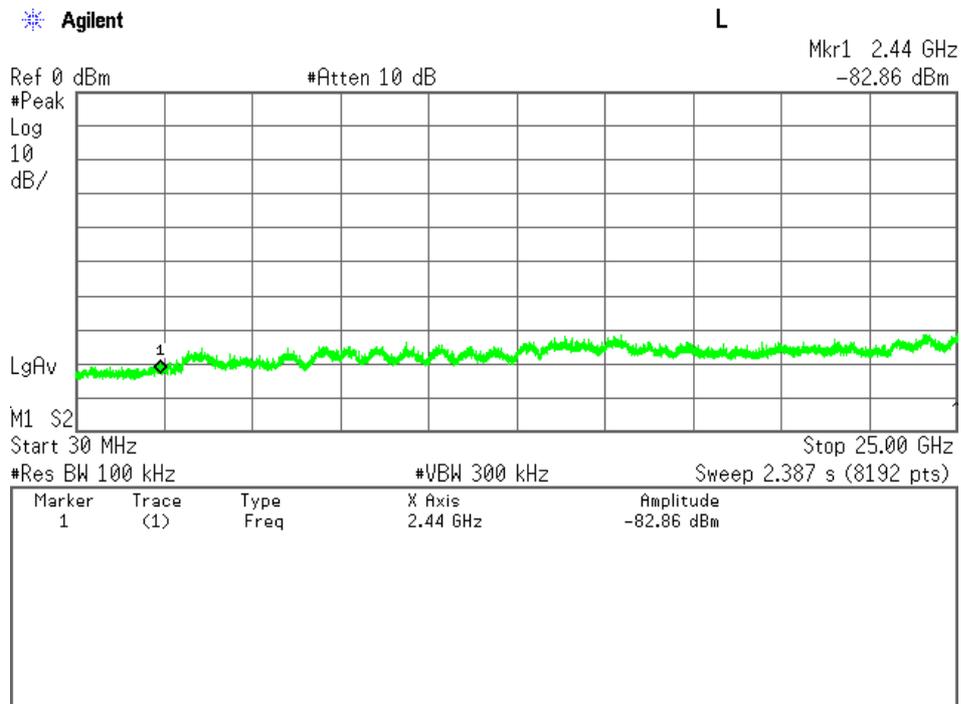
Middle Channel



High Channel

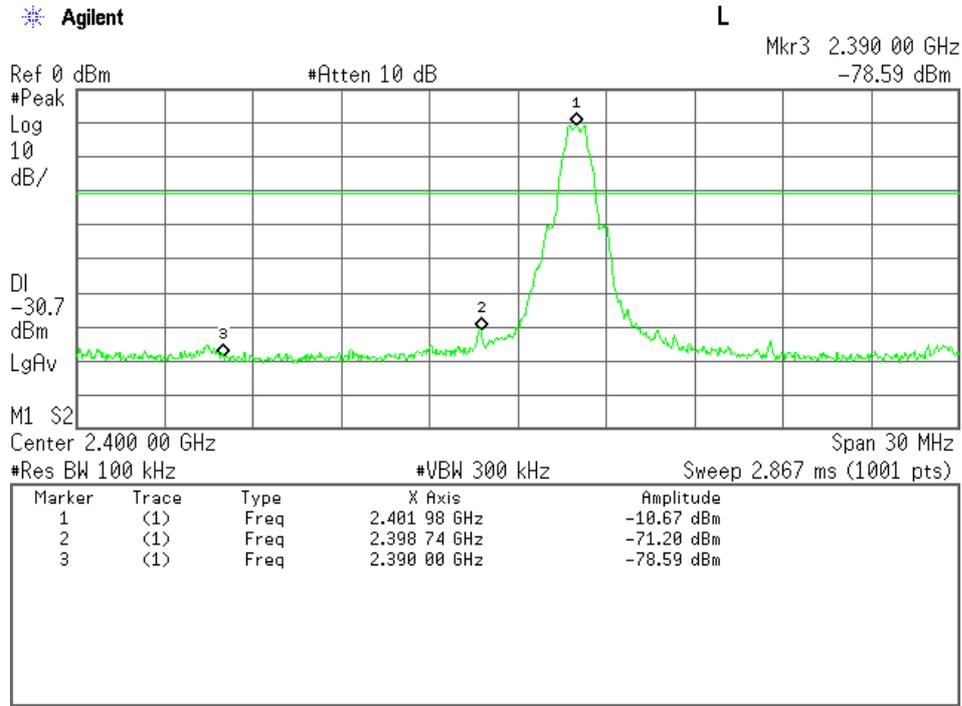


Receiving(Middle Channel)

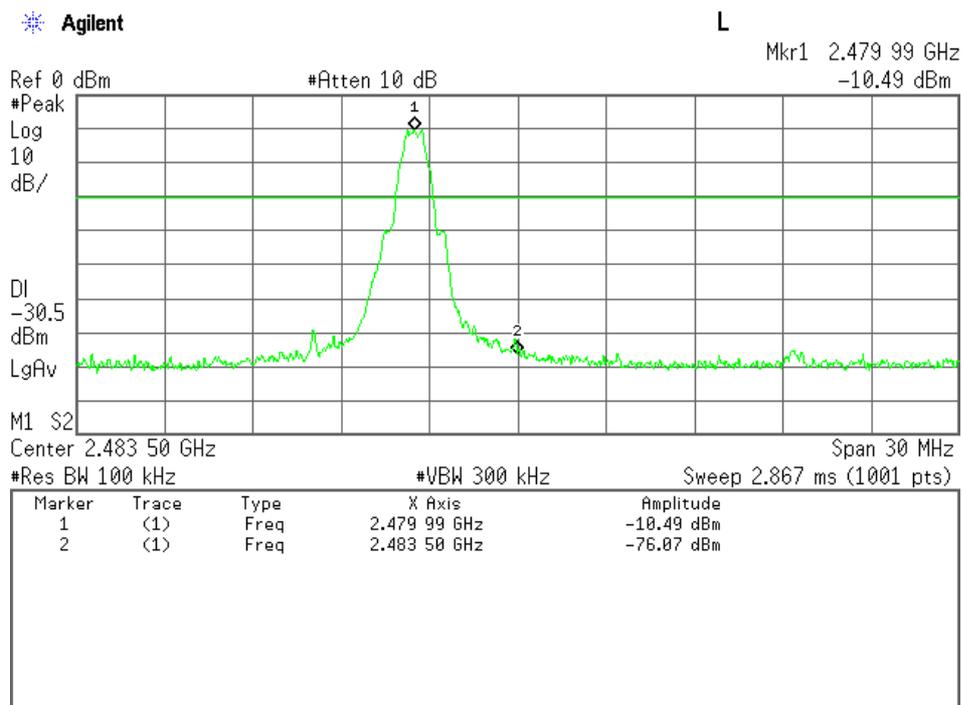


Band-Edge Emission

Low Channel, Band-Edge Emission



High Channel, Band-Edge Emission



7.8 AC Powerline Conducted Emission

For the requirements, - Applicable - Tested. - Not tested by applicant request.]
 - Not Applicable

For the limits, - Passed - Failed - Not judged

7.8.1 Worst Point and Measurement Uncertainty

Min. Limit Margin (Quasi-Peak) _____ 8.1 _____ dB at _____ 1.84 _____ MHz

Uncertainty of Measurement Results _____ +/-2.7 _____ dB(2σ)

Remarks : _____

7.8.2 Test Site

KITA-KANSAI Testing Center

Test site : SAITO - Anechoic chamber (A1) - Measurement room (M1)
 - Measurement room (M2) - Measurement room (M3)
 - Shielded room (S1) - Shielded room (S2)
 - Shielded room (S3) - Shielded room (S4)

7.8.3 Test Instruments

| Type | Model | Manufacturer | ID No. | Last Cal. | Interval |
|---------------|----------|-----------------|--------|-----------|----------|
| Test Receiver | ESU 26 | Rohde & Schwarz | A-6 | 2012/4 | 1 Year |
| AMN (main) | KNW-407R | Kyoritsu | D-39 | 2012/9 | 1 Year |
| RF Cable | RG223/U | SUHNER | H-9 | 2012/7 | 1 Year |

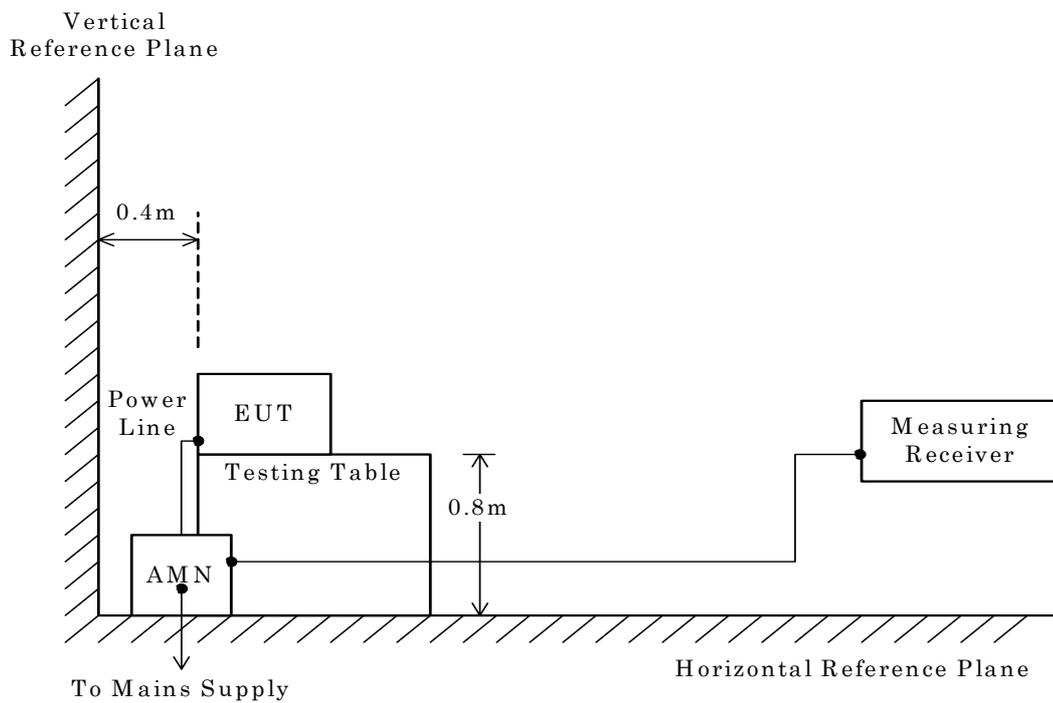
7.8.4 Test Method and Test Setup (Diagrammatic illustration)

The preliminary tests were performed using the scan mode of test receiver or spectrum analyzer to observe the emissions characteristics of the EUT.

The EUT configuration, cable configuration and mode of operation were determined for producing the maximum level of emissions.

This configurations was used for final tests.

– Side View –



NOTE

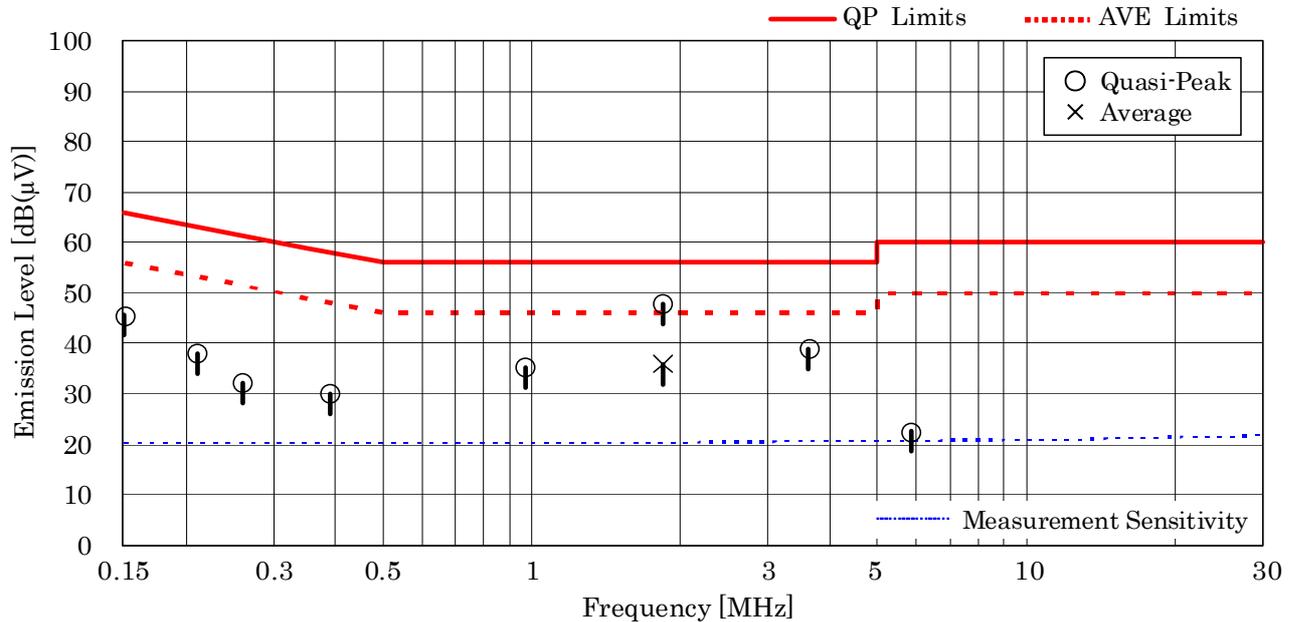
AMN : Artificial Mains Network

7.8.5 Test Data

Mode of EUT : All modes have been investigated and the worst case mode for channel (39ch: 2441MHz) has been listed.

Test Date: October 17, 2012
Temp.: 25 °C, Humi.: 62 %

| Frequency [MHz] | Corr. Factor [dB] | Meter Readings [dB(μV)] | | | | Limits [dB(μV)] | | Results [dB(μV)] | | Margin [dB] | Remarks |
|-----------------|-------------------|-------------------------|------|--------|------|-----------------|------|------------------|------|-------------|---------|
| | | VA | AVE | QP | VB | QP | AVE | QP | AVE | | |
| 0.15 | 10.3 | 35.3 | -- | 35.1 | -- | 66.0 | 56.0 | 45.6 | -- | +20.4 | - |
| 0.21 | 10.3 | 27.7 | -- | 27.8 | -- | 63.2 | 53.2 | 38.1 | -- | +25.1 | - |
| 0.26 | 10.3 | 21.9 | -- | 21.9 | -- | 61.4 | 51.4 | 32.2 | -- | +29.2 | - |
| 0.39 | 10.3 | 19.3 | -- | 19.8 | -- | 58.1 | 48.1 | 30.1 | -- | +28.0 | - |
| 0.97 | 10.3 | 25.0 | -- | 21.6 | -- | 56.0 | 46.0 | 35.3 | -- | +20.7 | - |
| <u>1.84</u> | 10.4 | 37.5 | 25.5 | 37.1 | 25.3 | 56.0 | 46.0 | 47.9 | 35.9 | + 8.1 | - |
| 3.63 | 10.4 | 28.5 | -- | 27.1 | -- | 56.0 | 46.0 | 38.9 | -- | +17.1 | - |
| 5.85 | 10.6 | 11.9 | -- | < 10.0 | -- | 60.0 | 50.0 | 22.5 | -- | +37.5 | - |



NOTES

1. The spectrum was checked from 0.15 MHz to 30 MHz.
2. The correction factor includes the AMN insertion loss and the cable loss.
3. The symbol of "<" means "or less".
4. The symbol of ">" means "more than".
5. The symbol of "--" means "not applicable".
6. Calculated result at 1.84 MHz, as the worst point shown on underline:
 Correction Factor + Meter Reading = 10.4 + 37.5 = 47.9 dB(μV)
7. QP : Quasi-Peak Detector / AVE : Average Detector
8. Test receiver setting(s) : CISPR QP 9 kHz / Average 9 kHz

7.9 Radiated Emission

The requirements are - Applicable - Tested. - Not tested by applicant request.]
 - Not Applicable

- Passed - Failed - Not judged

7.9.1 Worst Point and Measurement Uncertainty

Min. Limit Margin (Average) >5.4 dB at 22320.0 MHz

| | | | |
|------------------------------------|--------------------|---------------|-----------------|
| Uncertainty of Measurement Results | 9 kHz – 30 MHz | <u>+/-1.9</u> | dB(2 σ) |
| | 30 MHz – 300 MHz | <u>+/-4.3</u> | dB(2 σ) |
| | 300 MHz – 1000 MHz | <u>+/-5.4</u> | dB(2 σ) |
| | 1 GHz – 6 GHz | <u>+/-4.6</u> | dB(2 σ) |
| | 6 GHz – 18 GHz | <u>+/-5.2</u> | dB(2 σ) |
| | 18 GHz – 40 GHz | <u>+/-5.4</u> | dB(2 σ) |

Remarks : _____

7.9.2 Test Site

KITA-KANSAI Testing Center SAITO EMC Branch

- Anechoic chamber A1

- Anechoic chamber A2

7.9.3 Test Instruments

| Type | Model | Manufacturer | ID No. | Last Cal. | Interval |
|-----------------------|-------------------|-----------------|--------|-----------|----------|
| Test Receiver | ESU26 | Rohde & Schwarz | A-6 | 2012/4 | 1 Year |
| Loop Antenna | HFH2-Z2 | Rohde & Schwarz | C-2 | 2012/8 | 1 Year |
| RF Cable | RG213/U | SUHNER | H-28 | 2012/8 | 1 Year |
| Biconical Antenna | VHA9103/BBA9106 | Schwarzbeck | C-30 | 2012/5 | 1 Year |
| Log-periodic Antenna | UHALP9108-A1 | Schwarzbeck | C-31 | 2012/5 | 1 Year |
| RF Cable | S 10162 B-11 etc. | SUHNER | H-4 | 2012/3 | 1 Year |
| Site Attenuation | -- | ---- | H-15 | 2012/2 | 1 Year |
| Pre-Amplifier | WJ-6882-824 | Watkins Johnson | A-21 | 2012/1 | 1 Year |
| Pre-Amplifier | WJ-6611-513 | Watkins Johnson | A-23 | 2012/1 | 1 Year |
| Pre-Amplifier | BZ1840LD1 | B&Z | A-29 | 2012/1 | 1 Year |
| Pre-Amplifier | DBL-0618N515 | DBS Microwave | A-33 | 2012/1 | 1 Year |
| Horn Antenna | 91888-2 | EATON | C-41-1 | 2012/6 | 1 Year |
| Horn Antenna | 91889-2 | EATON | C-41-2 | 2012/6 | 1 Year |
| Horn Antenna | 3160-04 | EMCO | C-55 | 2011/6 | 2 Years |
| Horn Antenna | 3160-05 | EMCO | C-56 | 2011/6 | 2 Years |
| Horn Antenna | 3160-06 | EMCO | C-57 | 2011/6 | 2 Years |
| Horn Antenna | 3160-07 | EMCO | C-58 | 2011/6 | 2 Years |
| Horn Antenna | 3160-08 | EMCO | C-59 | 2011/6 | 2 Years |
| Horn Antenna | 3160-09 | EMCO | C-48 | 2011/6 | 2 Years |
| Attenuator | 54A-10 | Weinschel | D-29 | 2012/9 | 1 Year |
| Attenuator | 2-10 | Weinschel | D-79 | 2011/11 | 1 Year |
| Band Rejection Filter | BRM50701 | MICRO-TRONICS | D-93 | 2012/2 | 1 Year |
| RF Cable | SUCOFLEX102 | SUHNER | C-52 | 2012/7 | 1 Year |
| RF Cable | SUCOFLEX104 | SUHNER | C-66 | 2012/1 | 1 Year |
| RF Cable | SUCOFLEX104 | SUHNER | C-67 | 2012/1 | 1 Year |
| RF Cable | SUCOFLEX102EA | SUHNER | C-69 | 2012/1 | 1 Year |
| SVSWR | -- | ---- | H-19 | 2012/2 | 1 Year |

7.9.4 Test Method and Test Setup (Diagrammatic illustration)

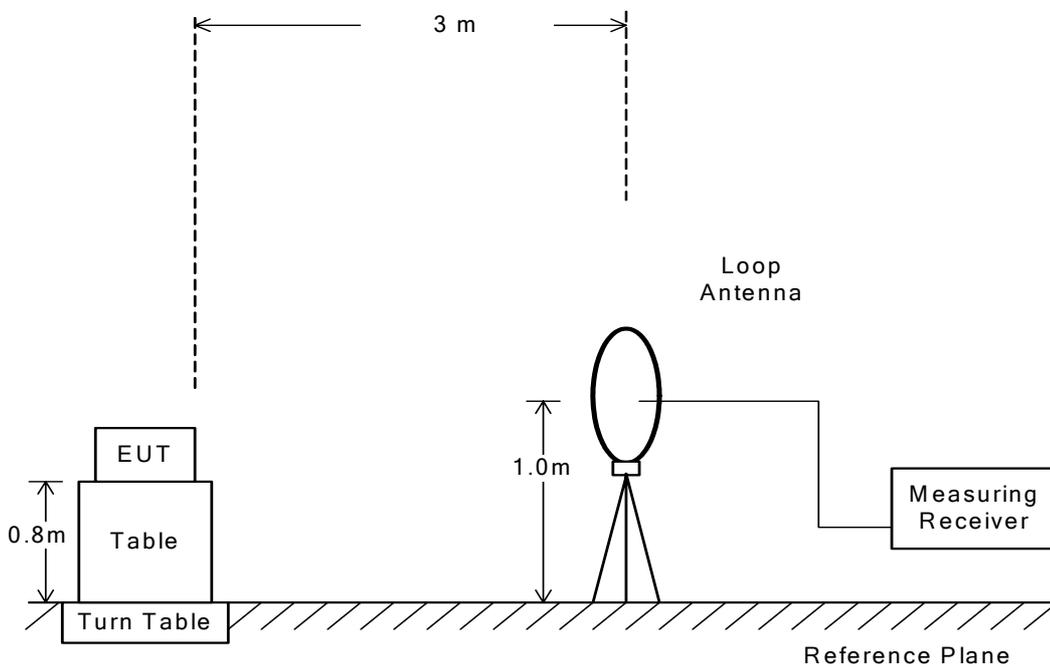
7.9.4.1 Radiated Emission 9 kHz – 30 MHz

The preliminary tests were performed at the measurement distance that specified for compliance to determine the emission characteristics of the EUT.

The EUT configuration(in X, Y and Z axis), cable configuration and mode of operation were determined for producing the maximum level of emissions.

This configurations was used for the final tests.

– Side View –



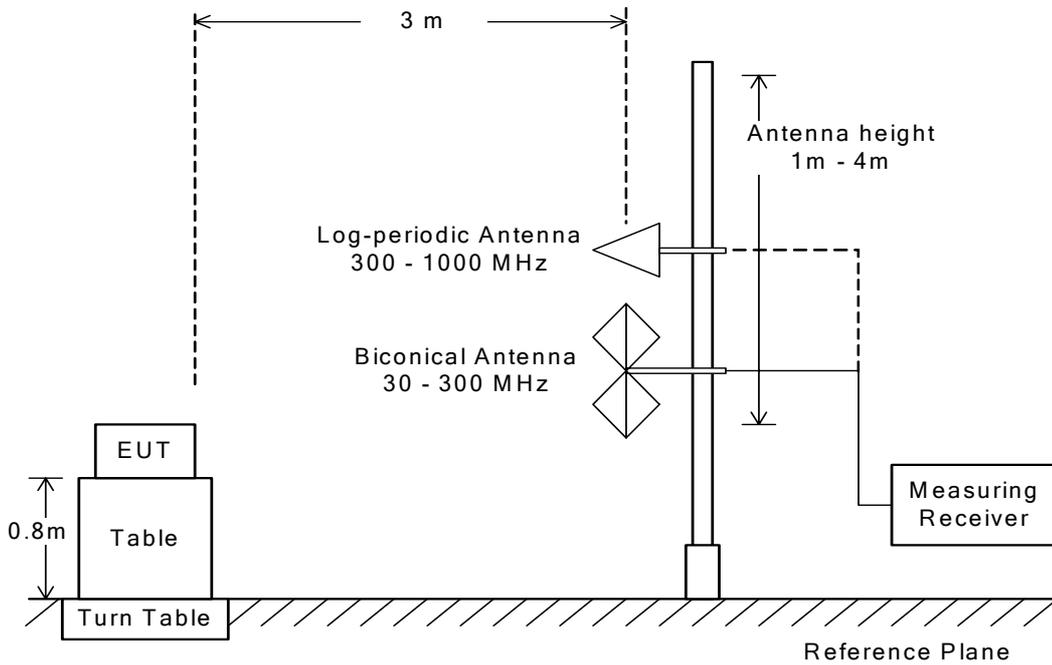
7.9.4.2 Radiated Emission 30 MHz – 1000 MHz

The preliminary tests were performed at the measurement distance that specified for compliance to determine the emission characteristics of the EUT.

The EUT configuration(in X, Y and Z axis), cable configuration and mode of operation were determined for producing the maximum level of emissions.

This configurations was used for the final tests.

– Side View –



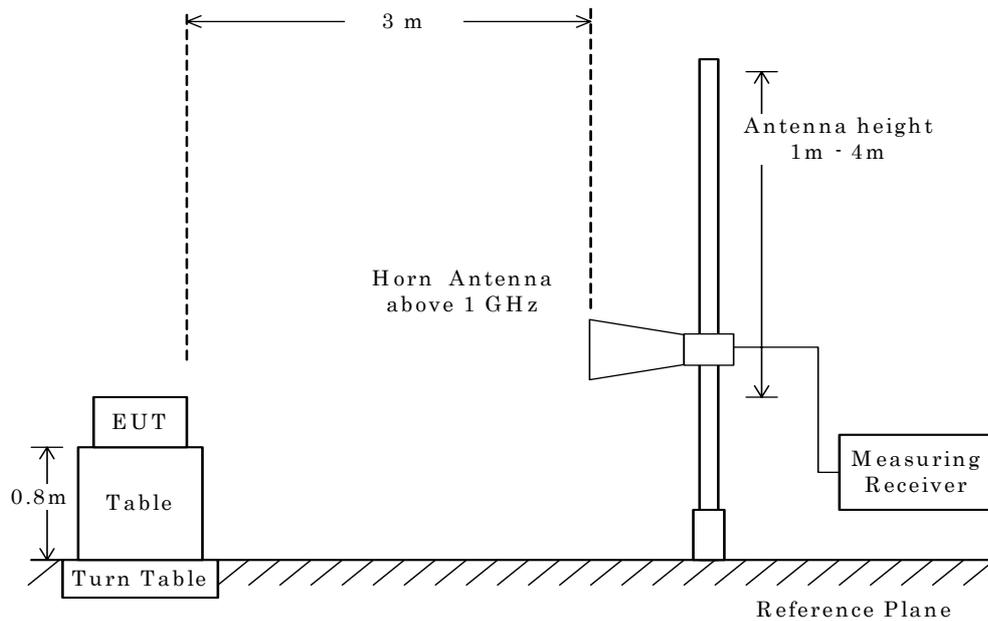
7.9.4.3 Radiated Emission above 1 GHz

The preliminary tests were performed at the measurement distance that specified for compliance to determine the emission characteristics of the EUT.

The EUT configuration(in X, Y and Z axis), cable configuration and mode of operation were determined for producing the maximum level of emissions.

This configurations was used for the final tests.

– Side View –



NOTE

The antenna height is scanned depending on the EUT's size and mounting height.

7.9.5 Test Data

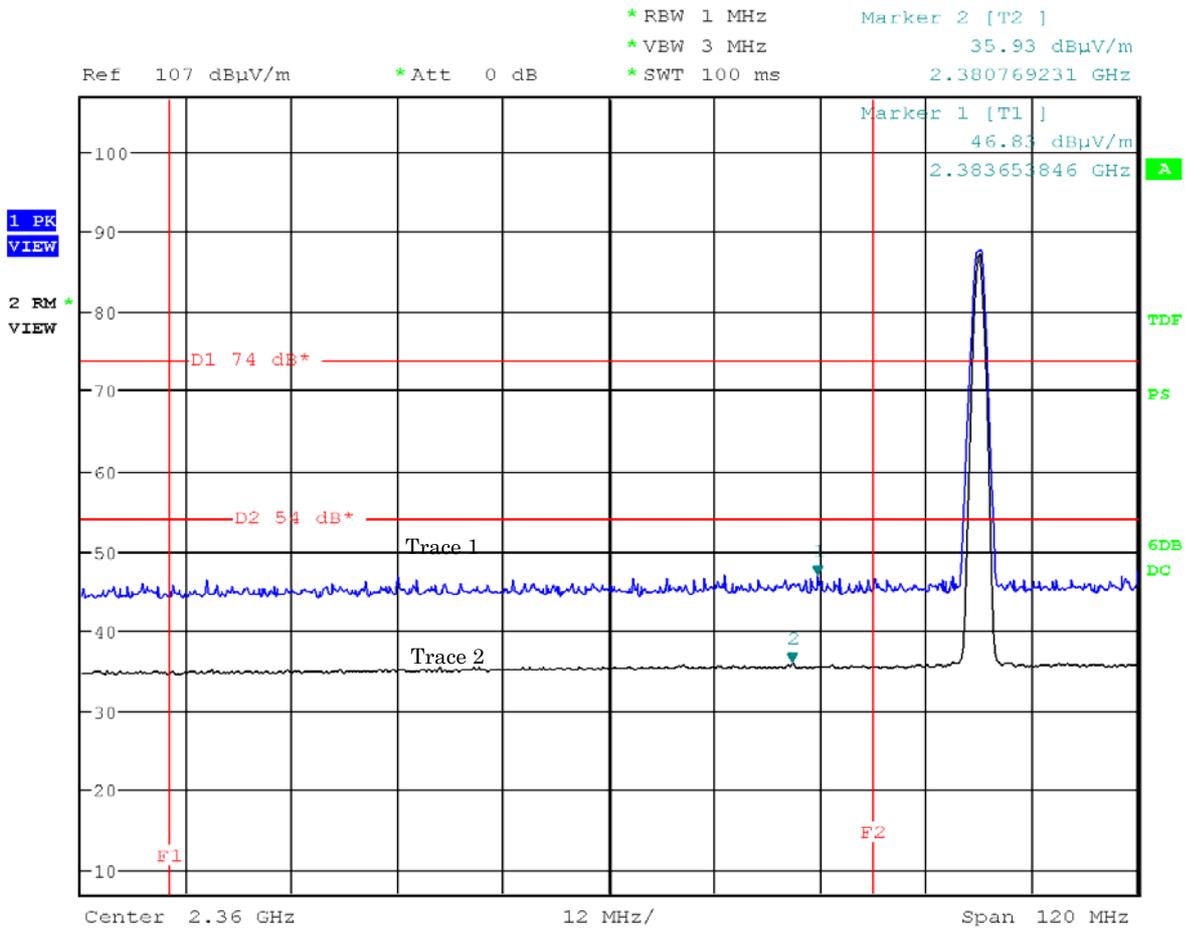
7.9.5.1 Band-edge Compliance

Test Date : October 15, 2012

Temp.:22°C, Humi:54%

Mode of EUT : Standard/EDR, Hopping off (0ch: 2402 MHz) (worst case)

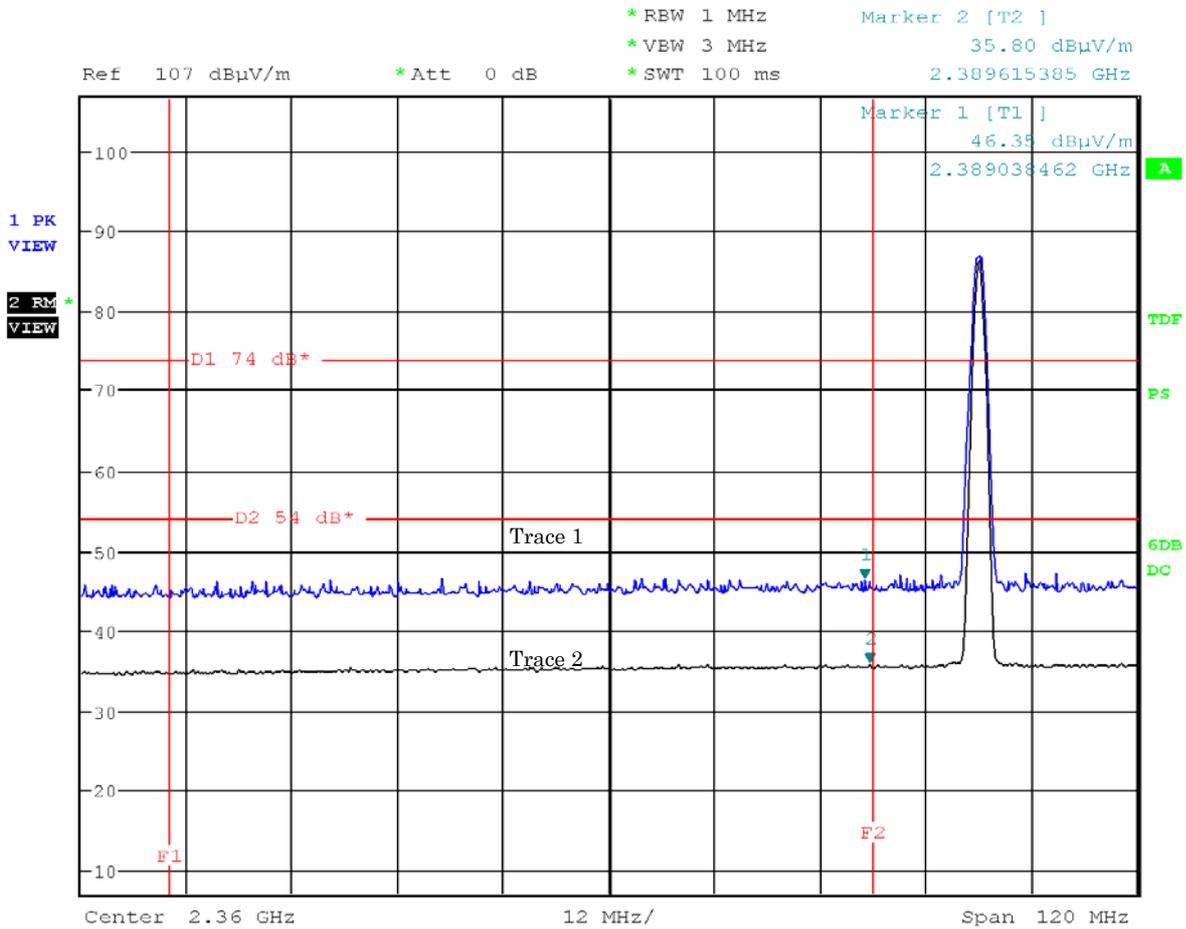
Antenna Polarization : Horizontal



Note: The trace 1 is Peak detection. The trace 2 is RMS detection.

Mode of EUT : Standard/EDR, Hopping off (0ch: 2402 MHz) (worst case)

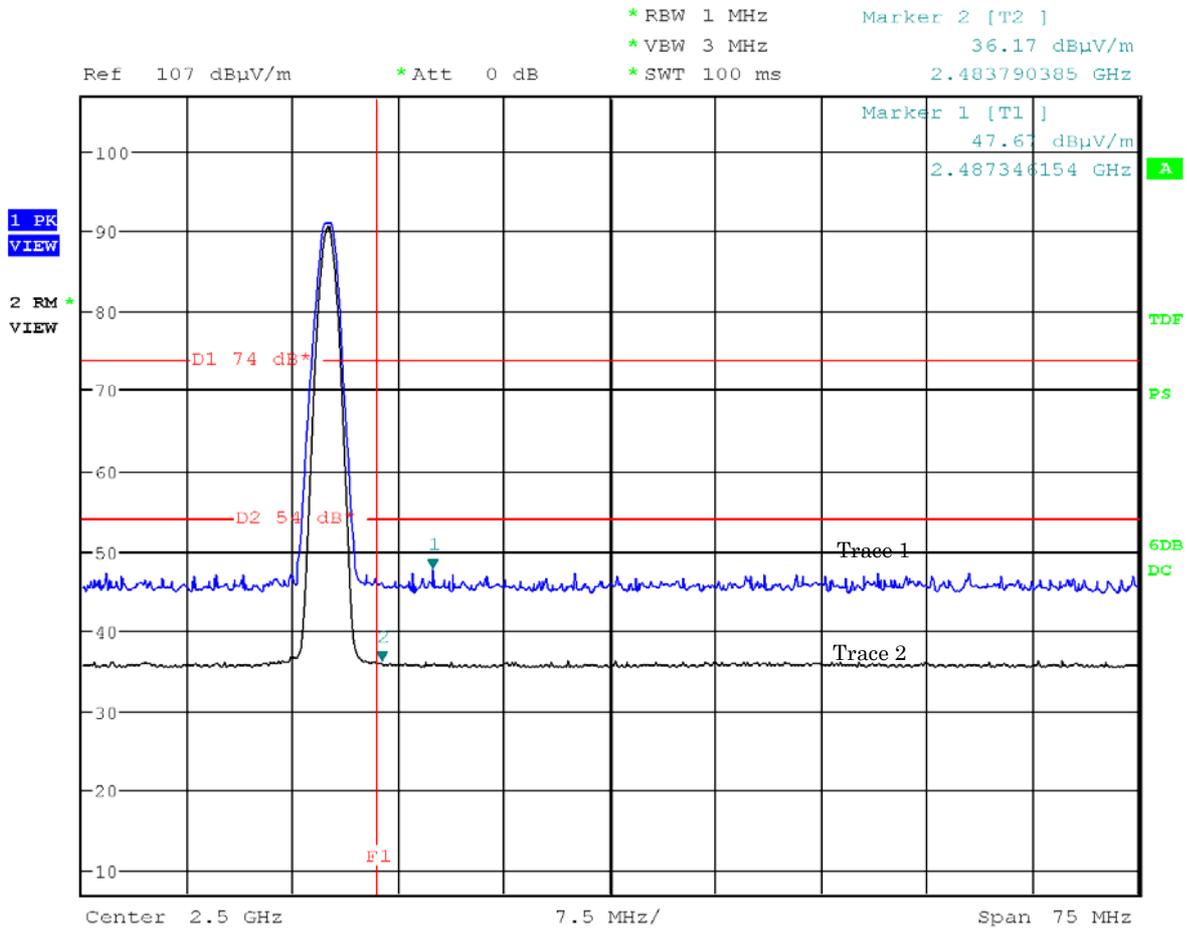
Antenna Polarization : Vertical



Note: The trace 1 is Peak detection. The trace 2 is RMS detection.

Mode of EUT : Standard/EDR, Hopping off (78ch: 2480 MHz) (worst case)

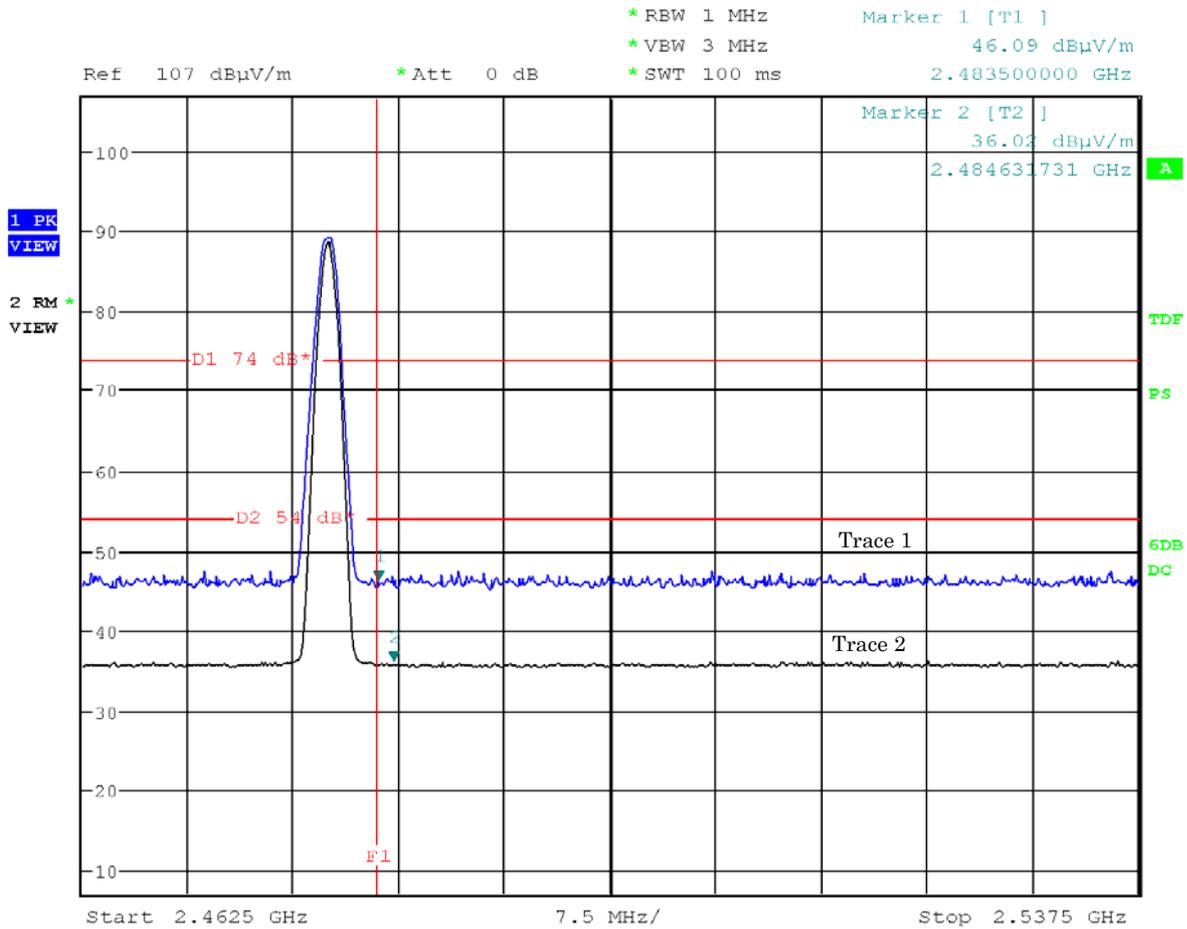
Antenna Polarization : Horizontal



Note: The trace 1 is Peak detection. The trace 2 is RMS detection.

Mode of EUT : Standard/EDR, Hopping off (78ch: 2480 MHz) (worst case)

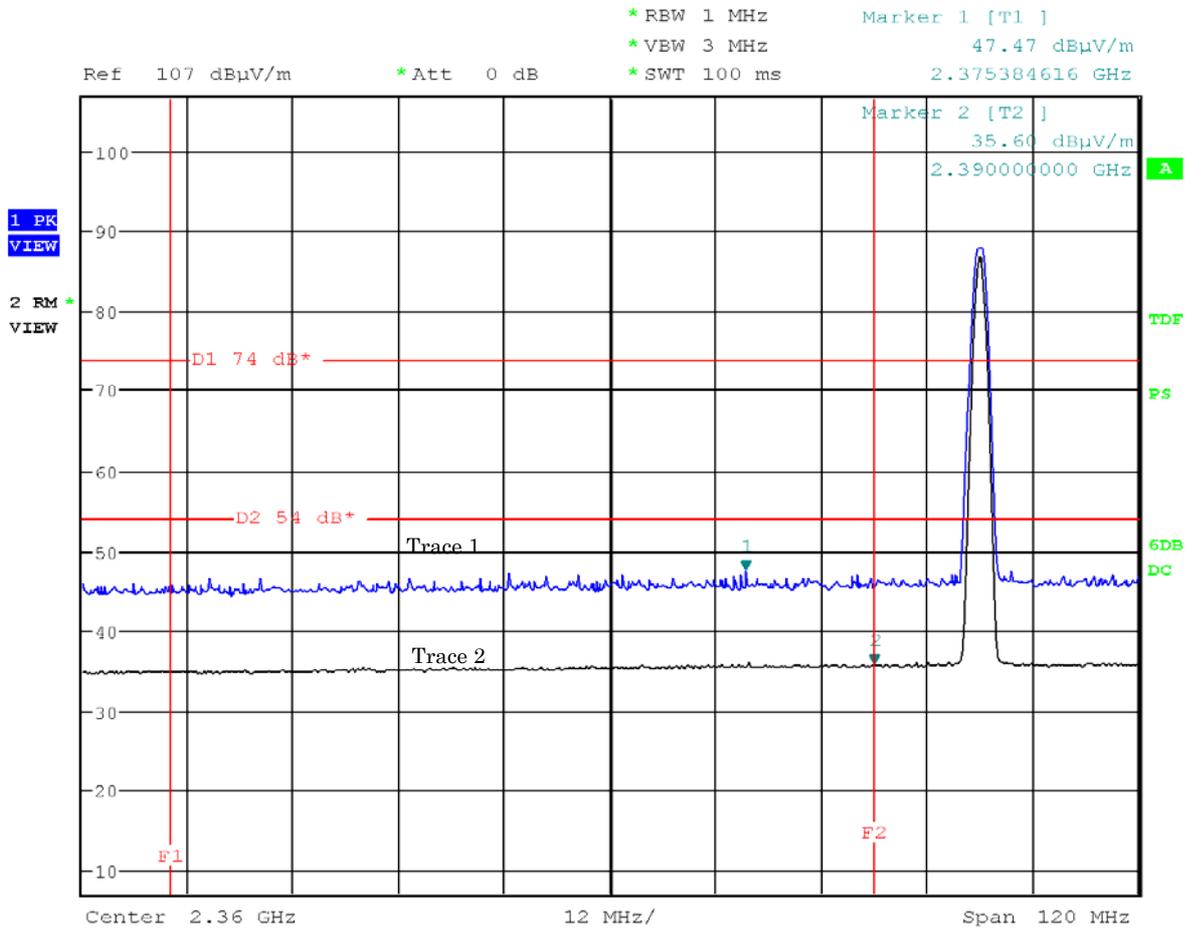
Antenna Polarization : Vertical



Note: The trace 1 is Peak detection. The trace 2 is RMS detection.

Mode of EUT : Low Energy, Hopping off (0ch: 2402 MHz) (worst case)

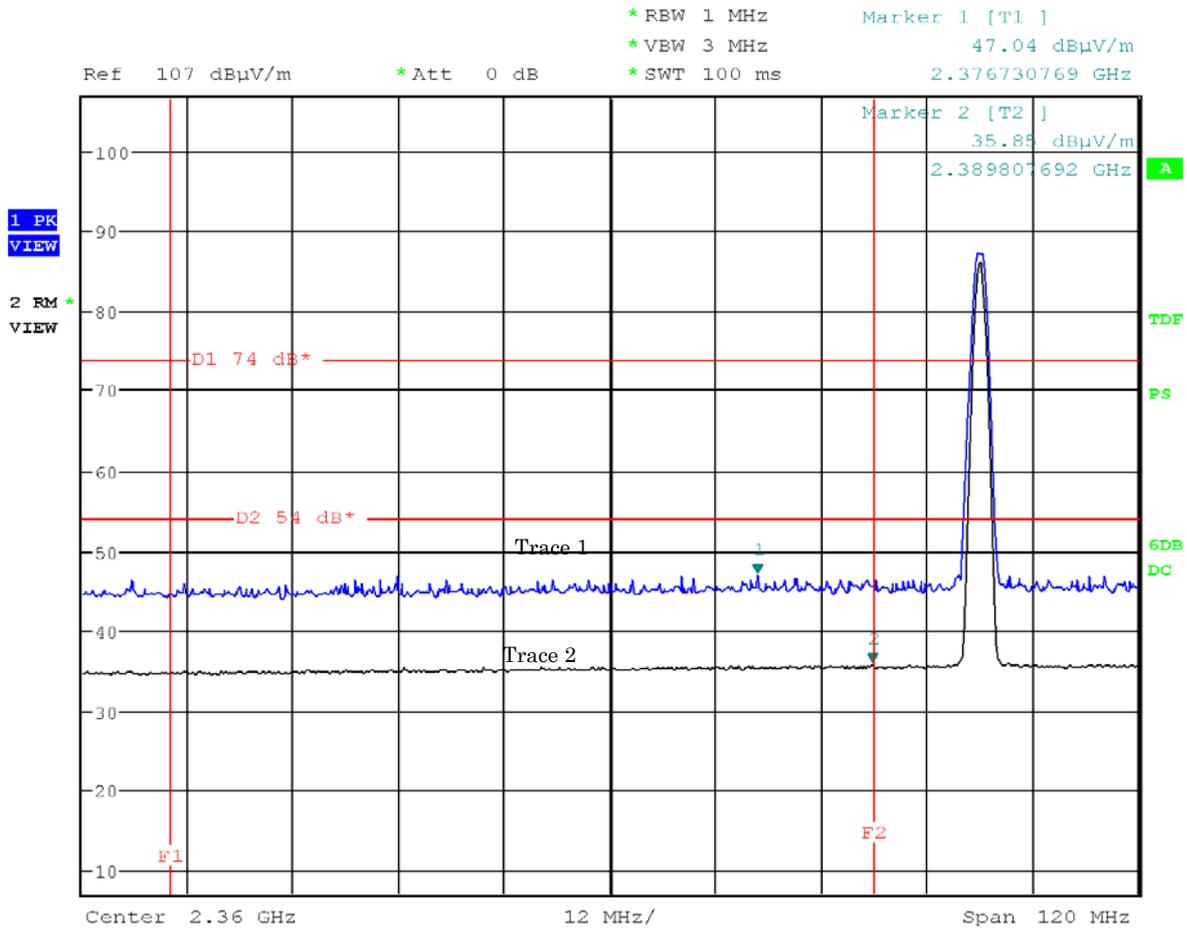
Antenna Polarization : Horizontal



Note: The trace 1 is Peak detection. The trace 2 is RMS detection.

Mode of EUT : Low Energy, Hopping off (0ch: 2402 MHz) (worst case)

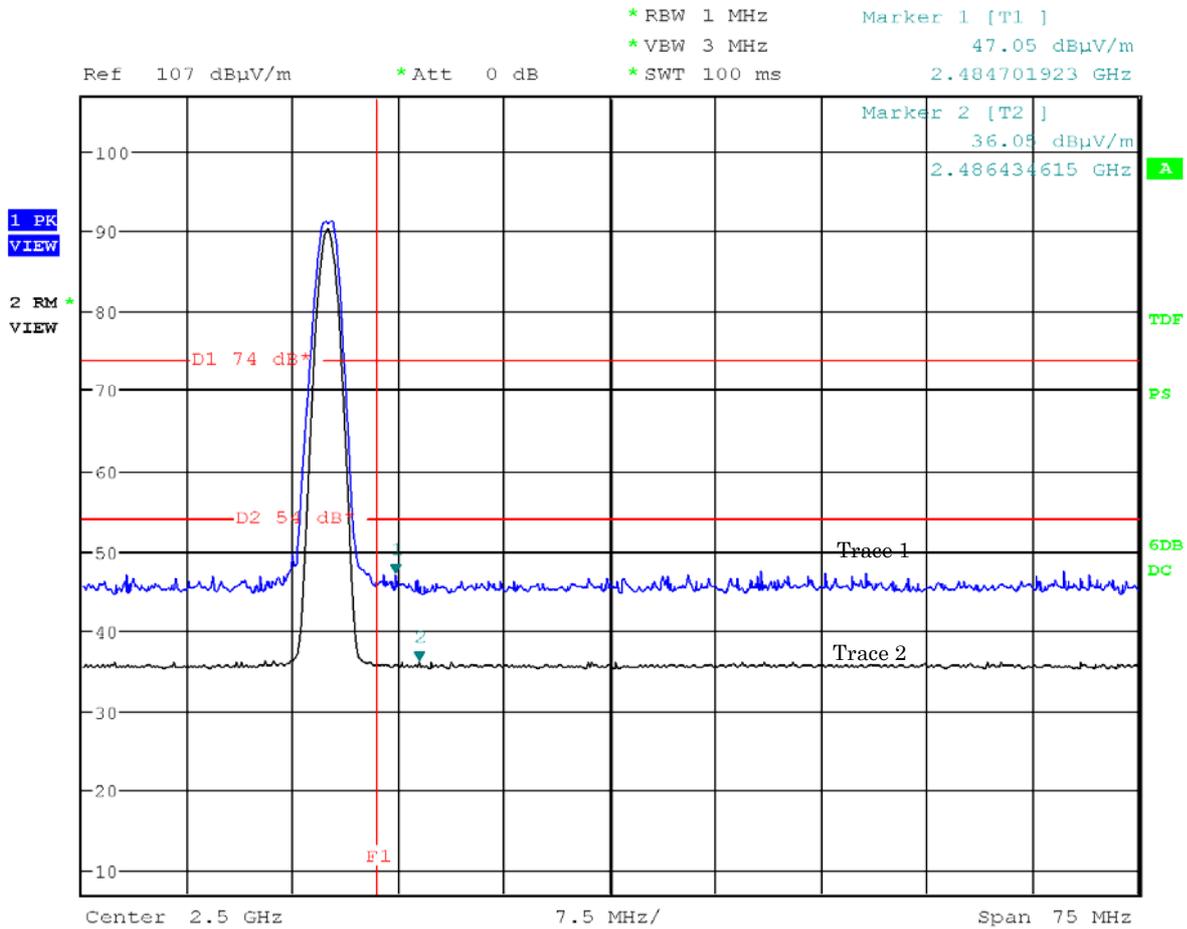
Antenna Polarization : Vertical



Note: The trace 1 is Peak detection. The trace 2 is RMS detection.

Mode of EUT : Low Energy, Hopping off (78ch: 2480 MHz) (worst case)

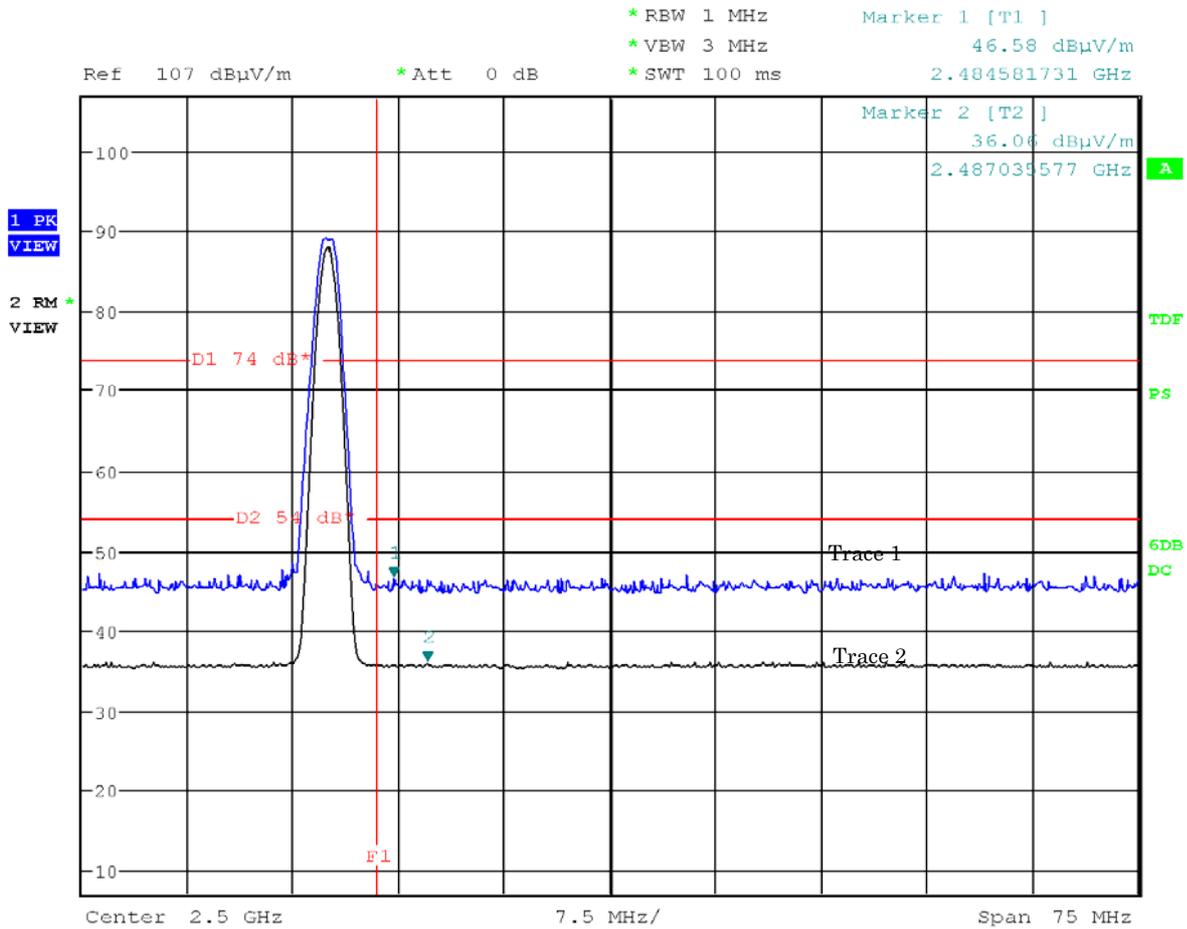
Antenna Polarization : Horizontal



Note: The trace 1 is Peak detection. The trace 2 is RMS detection.

Mode of EUT : Low Energy, Hopping off (78ch: 2480 MHz) (worst case)

Antenna Polarization : Vertical



Note: The trace 1 is Peak detection. The trace 2 is RMS detection.

7.9.5.2 Other Spurious Emission (9kHz – 30MHz)

Test Date : October 9, 2012

Temp.:23°C, Humi:54%

Mode of EUT : All modes have been investigated and the worst case mode has been listed.

Results : No spurious emissions in the range 20dB below the limit.

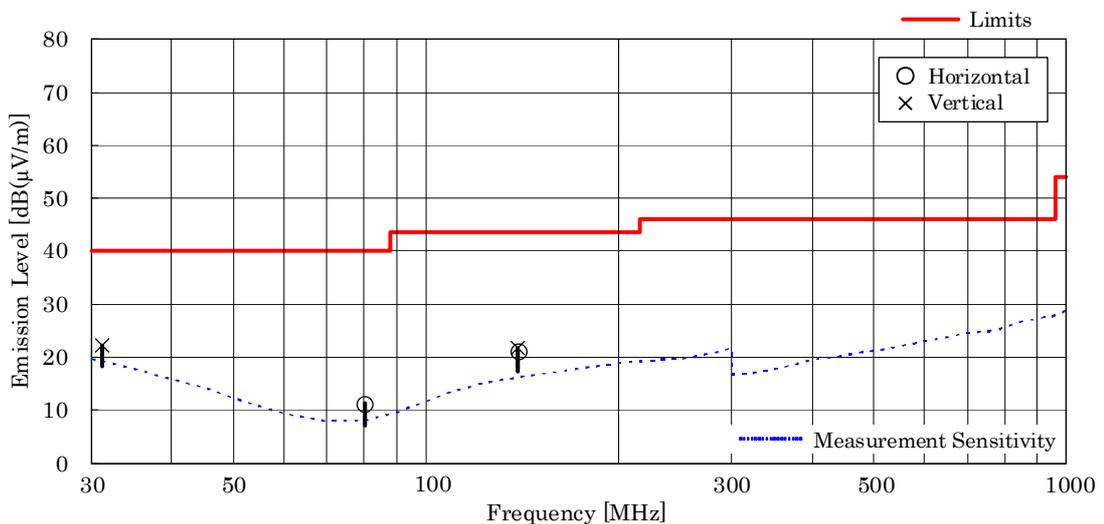
7.9.5.3 Other Spurious Emission (30MHz – 1000MHz)

Mode of EUT : All modes have been investigated and the worst case mode has been listed.

Test Date: October 9, 2012

Temp.: 23 °C, Humi: 54 %

| Frequency [MHz] | Antenna Factor [dB(1/m)] | Cable Loss [dB] | Meter Readings [dB(μV)] | | Limits [dB(μV/m)] | Results [dB(μV/m)] | | Margin [dB] | Remarks |
|--------------------|--------------------------------|-----------------------|----------------------------|-------|----------------------|-----------------------|-------|----------------|---------|
| | | | Hori. | Vert. | | Hori. | Vert. | | |
| 31.1 | 18.4 | 0.9 | < 0.0 | 3.0 | 40.0 | < 19.3 | 22.3 | +17.7 | - |
| 80.1 | 6.6 | 1.4 | 3.2 | < 0.0 | 40.0 | 11.2 | < 8.0 | +28.8 | - |
| 139.0 | 14.3 | 1.9 | 5.0 | 5.6 | 43.5 | 21.2 | 21.8 | +21.7 | - |



NOTES

1. Test Distance : 3 m
2. The spectrum was checked from 30 MHz to 1000 MHz.
3. The cable factor is consist of several combination conductor cables.
4. The symbol of “<” means “or less”.
5. The symbol of “>” means “more than”.
6. Calculated result at 31.1 MHz, as the worst point shown on underline:
Antenna Factor + Cable Loss + Meter Reading = 18.4 + 0.9 + 3.0 = 22.3 dB(μV/m)
7. Test receiver setting(s) : CISPR QP 120 kHz (QP : Quasi-Peak)

7.9.5.4 Other Spurious Emission (Above 1000MHz)

Mode of EUT : Standard/EDR (worst case)

Test Date: October 16, 2012

Temp.: 25 °C, Humi: 43 %

| Frequency [MHz] | Antenna Factor [dB(1/m)] | Corr. Factor [dB] | Meter Readings [dB(μV)] | | | | Limits [dB(μV/m)] | | Results [dB(μV/m)] | | Margin [dB] | Remarks |
|--------------------------------------|--------------------------------|-------------------------|-------------------------|--------|----------|--------|----------------------|------|-----------------------|--------|----------------|---------|
| | | | Horizontal | | Vertical | | PK | AVE | PK | AVE | | |
| | | | PK | AVE | PK | AVE | PK | AVE | PK | AVE | | |
| Test condition : Tx Low Ch | | | | | | | | | | | | |
| 4804.0 | 27.3 | -21.2 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 46.1 | < 36.1 | > +17.9 | A/B |
| 12010.0 | 33.6 | -27.3 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 46.3 | < 36.3 | > +17.7 | A/B |
| 19216.0 | 40.2 | -22.8 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 57.4 | < 47.4 | > + 6.6 | A/B |
| Test condition : TX Middle Ch | | | | | | | | | | | | |
| 4882.0 | 27.3 | -21.3 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 46.0 | < 36.0 | > +18.0 | A/B |
| 7323.0 | 29.9 | -19.6 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 50.3 | < 40.3 | > +13.7 | A/B |
| 12205.0 | 33.5 | -26.9 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 46.6 | < 36.6 | > +17.4 | A/B |
| 19528.0 | 40.3 | -22.7 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 57.6 | < 47.6 | > + 6.4 | A/B |
| Test condition : TX High Ch | | | | | | | | | | | | |
| 4960.0 | 27.3 | -21.4 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 45.9 | < 35.9 | > +18.1 | A/B |
| 7440.0 | 29.9 | -19.5 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 50.4 | < 40.4 | > +13.6 | A/B |
| 12400.0 | 33.5 | -26.7 | < 40.0 | < 30.0 | 40.0 | < 30.0 | 74.0 | 54.0 | < 46.8 | < 36.8 | > +17.2 | A/B |
| 19840.0 | 40.3 | -22.6 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 57.7 | < 47.7 | > + 6.3 | A/B |
| 22320.0 | 40.4 | -21.8 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 58.6 | < 48.6 | > + 5.4 | A/B |

Calculated result at 22320.0 MHz, as the worst point shown on underline:

| | | |
|-------------------|---|----------------|
| Antenna Factor | = | 40.4 dB(1/m) |
| Corr. Factor | = | -21.8 dB |
| +) Meter Reading | = | <30.0 dB(μV) |
| Result | = | <48.6 dB(μV/m) |

Minimum Margin: 54.0 - <48.6 = >5.4 (dB)

NOTES

1. Test Distance : 3 m
2. The spectrum was checked from 1 GHz to 25 GHz (10th harmonic of the highest fundamental frequency).
3. The correction factor is shown as follows:
 - Corr. Factor [dB] = Cable Loss + 20dB Pad Att. - Pre-Amp. Gain [dB] (1.0 - 7.6GHz)
 - Corr. Factor [dB] = Cable Loss + 10dB Pad Att. - Pre-Amp. Gain [dB] (7.6 - 18.0GHz)
 - Corr. Factor [dB] = Cable Loss - Pre-Amp. Gain [dB] (over 18 GHz)
4. The symbol of "<" means "or less".
5. The symbol of ">" means "more than".
6. PK : Peak Detector / AVE : Average Detector
7. Setting of measuring instrument(s) :

| | Detector Function | Resolution B.W. | Video B.W. | Sweep Time |
|---|-------------------|-----------------|------------|------------|
| A | Peak | 1 MHz | 3 MHz | AUTO |
| B | RMS | 1 MHz | 3 MHz | AUTO |

Mode of EUT : Standard/EDR (worst case)

Test Date: October 16, 2012

Temp.: 25 °C, Humi: 43 %

| Frequency [MHz] | Antenna Factor [dB(1/m)] | Corr. Factor [dB] | Meter Readings [dB(μV)] | | | | Limits [dB(μV/m)] | | Results [dB(μV/m)] | | Margin [dB] | Remarks |
|--------------------------------------|--------------------------------|-------------------------|-------------------------|--------|----------|--------|----------------------|------|-----------------------|--------|----------------|---------|
| | | | Horizontal | | Vertical | | PK | AVE | PK | AVE | | |
| | | | PK | AVE | PK | AVE | PK | AVE | PK | AVE | | |
| Test condition : RX Middle Ch | | | | | | | | | | | | |
| 2441.0 | 21.3 | -22.0 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 39.3 | < 29.3 | > +24.7 | A/B |
| 4882.0 | 27.3 | -21.6 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 45.7 | < 35.7 | > +18.3 | A/B |
| 7323.0 | 29.9 | -19.9 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 50.0 | < 40.0 | > +14.0 | A/B |

Calculated result at 7323.0 MHz, as the worst point shown on underline:

Antenna Factor = 29.9 dB(1/m)

Corr. Factor = -19.9 dB

+) Meter Reading = <30.0 dB(μV)

Result = <40.0 dB(μV/m)

Minimum Margin: 54.0 - <40.0 = >14.0 (dB)

NOTES

1. Test Distance : 3 m
2. The spectrum was checked from 1 GHz to 7.5 GHz .
3. The correction factor is shown as follows:
Corr. Factor [dB] = Cable Loss + 20dB Pad Att. - Pre-Amp. Gain [dB] (1.0 - 7.6GHz)
4. The symbol of "<" means "or less".
5. The symbol of ">" means "more than".
6. PK : Peak Detector / AVE : Average Detector
7. Setting of measuring instrument(s) :

| | Detector Function | Resolution B.W. | Video B.W. | Sweep Time |
|---|-------------------|-----------------|------------|------------|
| A | Peak | 1 MHz | 3 MHz | AUTO |
| B | RMS | 1 MHz | 3 MHz | AUTO |

Mode of EUT : Low Energy

Test Date: October 16, 2012

Temp.: 25 °C, Humi: 43 %

| Frequency [MHz] | Antenna Factor [dB(1/m)] | Corr. Factor [dB] | Meter Readings [dB(μV)] | | | | Limits [dB(μV/m)] | | Results [dB(μV/m)] | | Margin [dB] | Remarks |
|--------------------------------------|--------------------------------|-------------------------|-------------------------|--------|----------|--------|----------------------|------|-----------------------|--------|----------------|---------|
| | | | Horizontal | | Vertical | | PK | AVE | PK | AVE | | |
| Test condition : Tx Low Ch | | | | | | | | | | | | |
| 4804.0 | 27.3 | -21.2 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 46.1 | < 36.1 | > +17.9 | A/B |
| 12010.0 | 33.6 | -27.3 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 46.3 | < 36.3 | > +17.7 | A/B |
| 19216.0 | 40.2 | -22.8 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 57.4 | < 47.4 | > + 6.6 | A/B |
| Test condition : TX Middle Ch | | | | | | | | | | | | |
| 4880.0 | 27.3 | -21.3 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 46.0 | < 36.0 | > +18.0 | A/B |
| 7320.0 | 29.9 | -19.6 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 50.3 | < 40.3 | > +13.7 | A/B |
| 12200.0 | 33.5 | -26.9 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 46.6 | < 36.6 | > +17.4 | A/B |
| 19520.0 | 40.2 | -22.7 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 57.5 | < 47.5 | > + 6.5 | A/B |
| Test condition : TX High Ch | | | | | | | | | | | | |
| 4960.0 | 27.3 | -21.4 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 45.9 | < 35.9 | > +18.1 | A/B |
| 7440.0 | 29.9 | -19.5 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 50.4 | < 40.4 | > +13.6 | A/B |
| 12400.0 | 33.5 | -26.7 | < 40.0 | < 30.0 | 40.0 | < 30.0 | 74.0 | 54.0 | < 46.8 | < 36.8 | > +17.2 | A/B |
| 19840.0 | 40.3 | -22.6 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 57.7 | < 47.7 | > + 6.3 | A/B |
| 22320.0 | 40.4 | -21.8 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 58.6 | < 48.6 | > + 5.4 | A/B |

Calculated result at 22320.0 MHz, as the worst point shown on underline:

Antenna Factor = 40.4 dB(1/m)

Corr. Factor = -21.8 dB

+) Meter Reading = <30.0 dB(μV)

Result = <48.6 dB(μV/m)

Minimum Margin: 54.0 - <48.6 = >5.4 (dB)

NOTES

1. Test Distance : 3 m
2. The spectrum was checked from 1 GHz to 25 GHz (10th harmonic of the highest fundamental frequency).
3. The correction factor is shown as follows:
 - Corr. Factor [dB] = Cable Loss + 20dB Pad Att. - Pre-Amp. Gain [dB] (1.0 - 7.6GHz)
 - Corr. Factor [dB] = Cable Loss + 10dB Pad Att. - Pre-Amp. Gain [dB] (7.6 - 18.0GHz)
 - Corr. Factor [dB] = Cable Loss - Pre-Amp. Gain [dB] (over 18 GHz)
4. The symbol of "<" means "or less".
5. The symbol of ">" means "more than".
6. PK : Peak Detector / AVE : Average Detector
7. Setting of measuring instrument(s) :

| | Detector Function | Resolution B.W. | Video B.W. | Sweep Time |
|---|-------------------|-----------------|------------|------------|
| A | Peak | 1 MHz | 3 MHz | AUTO |
| B | RMS | 1 MHz | 3 MHz | AUTO |

Mode of EUT : Low Energy

Test Date: October 16, 2012

Temp.: 25 °C, Humi: 43 %

| Frequency [MHz] | Antenna Factor [dB(1/m)] | Corr. Factor [dB] | Meter Readings [dB(μV)] | | | | Limits [dB(μV/m)] | | Results [dB(μV/m)] | | Margin [dB] | Remarks |
|--------------------------------------|--------------------------------|-------------------------|-------------------------|--------|----------|--------|----------------------|------|-----------------------|--------|----------------|---------|
| | | | Horizontal | | Vertical | | PK | AVE | PK | AVE | | |
| | | | PK | AVE | PK | AVE | PK | AVE | PK | AVE | | |
| Test condition : RX Middle Ch | | | | | | | | | | | | |
| 2440.0 | 21.3 | -22.0 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 39.3 | < 29.3 | > +24.7 | A/B |
| 4880.0 | 27.3 | -21.6 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 45.7 | < 35.7 | > +18.3 | A/B |
| 7320.0 | 29.9 | -19.9 | < 40.0 | < 30.0 | < 40.0 | < 30.0 | 74.0 | 54.0 | < 50.0 | < 40.0 | > +14.0 | A/B |

Calculated result at 7320.0 MHz, as the worst point shown on underline:

Antenna Factor = 29.9 dB(1/m)

Corr. Factor = -19.9 dB

+) Meter Reading = <30.0 dB(μV)

Result = <40.0 dB(μV/m)

Minimum Margin: 54.0 - <40.0 = >14.0 (dB)

NOTES

1. Test Distance : 3 m
2. The spectrum was checked from 1 GHz to 7.5 GHz .
3. The correction factor is shown as follows:
Corr. Factor [dB] = Cable Loss + 20dB Pad Att. - Pre-Amp. Gain [dB] (1.0 - 7.6GHz)
4. The symbol of "<" means "or less".
5. The symbol of ">" means "more than".
6. PK : Peak Detector / AVE : Average Detector
7. Setting of measuring instrument(s) :

| | Detector Function | Resolution B.W. | Video B.W. | Sweep Time |
|---|-------------------|-----------------|------------|------------|
| A | Peak | 1 MHz | 3 MHz | AUTO |
| B | RMS | 1 MHz | 3 MHz | AUTO |